THE IRON TRADE REVIEW

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Trend is in the Right Direction

Placing of Pennsylvania Car Orders Has Good Effect—Steel Bars Active—Some Steel Making Iron Bought at Pittsburgh

THE very hopeful feeling amounting almost to confidence that the United States will not become involved in the European war has prevented all but the most timid from deferring the placing of orders for iron and steel products and machinery and moderate progress toward greater activity continues. The actual distribution of orders for 14,900 cars for the Pennsylvania lines has had a reassuring effect, as numerous reports have been in circulation that the carrying out of the buying program of this great system had been indefinitely postponed. It is expected that within a day or two the Pennsylvania will distribute orders for 138,000 tons of rails. Owing to the rigid specification, railmakers have quoted $3 to $5 a ton above the $30 mill price for open hearth rails. The Algoma Steel Corporation, Sault Ste. Marie, Ont., is bidding on the business, but is not expected to get any considerable part of the tonnage.

The week's bookings on sheets and tin plate by some important companies were the best in three years. There is also improvement in tubes. The United States Steel Corporation's operations continue to increase and last week were considerably better than 75 per cent of ingot capacity. This week's schedule is a shade below 80. It is noteworthy that the foreign business of the Corporation represents only a slight increase over its normal foreign business.

Bars

Some very large tonnages of steel bars for use in manufacturing shrapnel, explosive shells and guns, are pending and it is understood that at least 27,000 tons of rounds for shrapnel have just been placed. The making of 1,000,000 rifles by the Westinghouse company will call for a large steel tonnage. A Cleveland company has sent out an inquiry for 40,000 tons for the manufacture of gun barrels. The policy of selling bar iron at somewhat higher prices is being maintained in the Chicago district and another advance of $1 a ton has been announced.

Pig Iron

Cast iron pipe foundries have continued as the principal buyers of pig iron in eastern territory and several round tonnages have been placed. Fair activity has continued at Chicago and other districts in the central west, and in the south, $10 is the prevailing quotation. At Pittsburgh, a consumer of bessemer has bought 3,000 tons at $13.75, furnace, and a steel company has closed for 10,000 tons of basic.

Plates

The Carnegie Steel Co. will furnish 9,000 tons of plates and shapes for two tank steamers, which have just been awarded to eastern yards. The company will also furnish 3,000 tons for pontoon work at Norfolk. While, on the whole, plate prices are somewhat firmer, weakness has not entirely disappeared, especially in the Chicago district.

Sheets

Owing to the very high price of spelter, the American Sheet & Tin Plate Co. has advanced its quotation to 3.60c for No. 28 galvanized sheets and some sales have been made as high as 3.75c. The very strong demand for spelter for export continues.

Structural Material

Plans for making further additions to plants engaged in the manufacture of war materials are being considered and, if carried out, will require a fair tonnage of shapes. On the other hand, the possibility of the United States becoming involved in the war has deterred the carrying-out of some building projects. Lettings for April, reported by the Bridge Builders' Society, amounting to 107,500 tons, were somewhat better than had been expected.

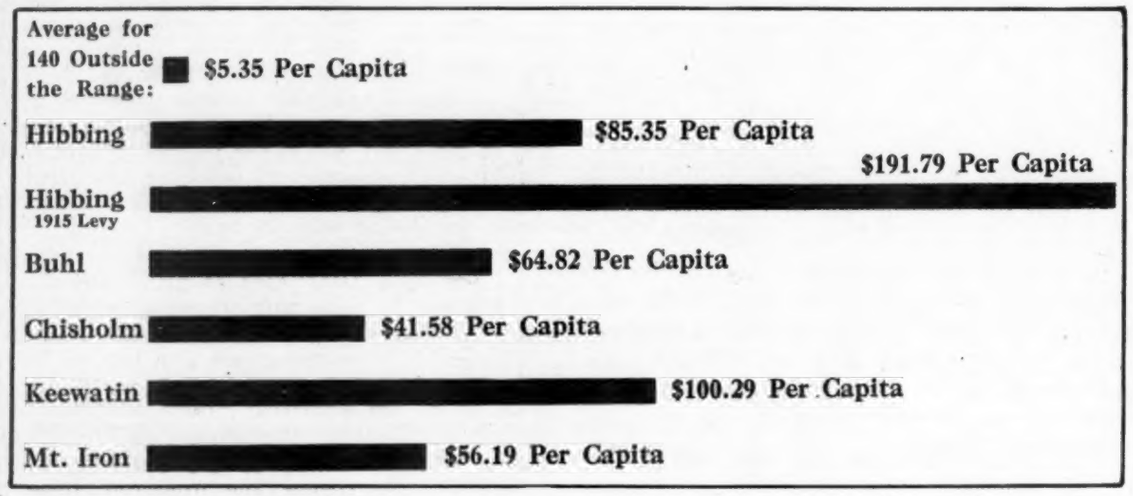
Ferro Manganese

The ferro-manganese situation continues to present complications. The $88 quotation has been withdrawn and it is understood that $98 has been quoted by some sellers. Slight modifications in the drastic requirements demanded by the British government concerning the use of ferro-manganese have been granted.

THE OPEN HEARTH

The Iron Country Today—Reckless Expenditures of Some Towns

THE Lake Superior iron ore country is always intensely interesting, but nowadays it seems to have problems of unusual importance. One of these is due to the tremendous expeditures for municipal purposes by a few of the villages on the Mesabi, particularly Hibbing. At the session of the Minnesota legislature just adjourned, an effort was made to pass a bill to limit to $25 per capita the annual levy of taxes in all villages and in some cities in the state. The bill failed, but the fight is still on and will be continued with renewed vigor at the next session of the legislature. The Duluth papers announced a few days ago that next month members of the Minnesota legislature would visit Hibbing and that it was being arranged to have the statesmen arrive in town at night, so that their first impression would be obtained by seeing "the great white way".



TAXES LEVIED PER CAPITA FOR MUNICIPAL PURPOSES IN 1914 BY VILLAGES AND CITIES OF MINNESOTA

What is "the great white way" of Hibbing? The writer was not fortunate enough to see Hibbing at night, but he arrived at the depot last Saturday and rode up the village streets to the Mahoning mine through a fierce hail storm. It takes more than a hail storm, however, to hide the lamp posts and their big white globes. There is no single "great white way", for "great white ways" greet the visitor from all directions; the smallest side street is lighted just as brilliantly as the principal streets. There are 668 ornamental metal posts with 3,136 lights of 40 watts each, installed at the cost of $81,833. Hibbing, with a population of 8,832 in 1910 and about 13,000 now, is said to have more street lights than Columbus, O., with a population of about 200,000. In Duluth, which had a population in 1910 of 78,466, the city and village taxes in 1914 were $11.01 per capita, while in Hibbing they were $85.35 per capita. The growth of the two cities would, of course, change these figures somewhat, but the extravagance in the expenditures would not be made less glaring. Hibbing levied $750,878 for village purposes in 1913, and $753,800 in 1914, and the levy for 1915 amounts to $1,693,933, which, on the basis of the census of 1910, is $191.79 per capita. The extravagant expenditure is not confined to the lighting system, but is dis-

THE OPEN HEARTH

closed in expenditures for many village purposes. No one, of course, objects to good pavements, fine schools and an ample sewerage system, but the expenditures for some of these purposes are on a scale of extravagance similar to that for lighting. Hibbing is not the only offender in this respect. For example, a school building at Virginia, a nearby mining town, was erected at a cost of $410 per seat. A building at Eveleth cost $250,000, or $151.93 per seat. Contrasted with these figures are those relating to the cost of the manual training school, with all modern equipment, erected at Duluth at a cost of $125 per seat. In the city of Cleveland, in the new school buildings elaborately equipped with swimming pools and other modern features, the total cost is seldom over $150 per seat.

What is the explanation for all this extravagance on the iron range? Simply that it is easy to spend the other fellow's money.

Hibbing is the taxless town; that is, it is almost free from taxes for all except the mining companies. A member of the Minnesota legislature told the writer last week that on the house in which he lives in one of the larger cities of the state he is paying more than $60 per year taxes, while he knew a man in Hibbing, living in a house worth five times as much, who paid a little less than $5 per year in taxes. While some of the range newspapers declared that the recently defeated bill limiting tax levies was fair, others opposed it. For example, *Mesaba Ore*, of Hibbing, declared: "The *Ore* will continue to contend that the village and city councils of the iron range are remiss in their full duty to the people of these communities because they do not levy the full amount allowed by law and spend it every year—whether it be extravagance or not."

The question of taxation is a serious one for the mining companies. Last year, the Oliver Iron Mining Co. mined about 16,000,000 tons of ore and paid about $4,000,000 in taxes. The losses of many companies, including the Steel Corporation, were heavy, and no one is bold enough to predict whether the figures will be on the right side of the ledger this year. People are wondering what can be done to put a stop to the reckless extravagance of village officials.

And while the people wonder, members of the legislature are going to see "the great white way".

Rail and Water Divorce

DIVORCE of the trunk line railroads from ownership or interest in package freight lines on the Great Lakes ordered by the interstate commerce commission last week is an event of far-reaching importance. As the separation is not to become effective until Dec. 1, package freight business on the lakes will not be interfered with during the present season of navigation, but the question is—What arrangement will be made for carrying on the business after Dec. 1, and what will be the effect on rail and water rates?

It is well known that seldom in past years have the railroads made any money in operating their boats, and during the past two or three years losses have been heavy. Whoever operates the boats in future years will be compelled to purchase or lease the terminals now owned by the railroads. Including this expense, it is difficult to see how it will be possible for the new owners to operate the boats at lower rates than have been made by the railroads. We predict that rates will not be lower, and are of the opinion that they will probably be higher, and we also venture the opinion that the interstate commerce commission will, within a year, be forced to see the error of its way in this important case, as it was in the decision relating to terminal railroads. In the latter case, the decision declaring terminal railroads to be merely plant facilities did not involve the selling of property as in this case, in which it will be absolutely necessary to find new owners for vessels valued at from $9,000,000 to $10,000,000.

The decision is another illustration of the extreme difficulty of readjusting relations of common carriers and the public by commissions. In this case, it is evident that the public will suffer. When the commission resumes the investigation, as it surely will be necessary to do, it will do well to obtain the assistance of practical men and not depend to such a large extent as in the past upon clerks who have no practical knowledge of transportation problems.

Prices Present and Past

Quotations on leading products May 19, average for April, 1915, average for February, 1915, and average for May, 1914. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices May 19, 1915.	Average for Apr., 1915.	Average for Feb., 1915.	Aver. for May, 1914.
Bessemer pig iron, Pittsburgh..	$14.55	$14.55	$14.63	$14.90
Basic pig iron, Pittsburgh.....	13.60	13.45	13.45	13.90
No. 2 Fdy. pig iron, Pittsburgh	13.45	13.45	13.70	14.09
Northern No. 2 Fdy., Chgo....	13.00	13.00	13.00	14.25
Lake Superior Charcoal, Chgo..	15.75	15.75	15.75	15.75
Malleable, Bessemer, Chgo.....	13.00	13.00	13.00	14.25
Southern No. 2, Birmingham...	9.75	9.50	9.50	10.50
Southern Ohio No. 2, Ironton.	12.50	12.75	12.75	13.50
Basic, eastern Pa.....	13.25	13.25	13.50	14.00
No. 2X Virginia furnace.....	12.50	12.50	12.50	12.75
No. 2X foundry, Philadelphia..	14.25	14.25	14.25	14.75
Ferro mang., Balt., (prompt)..	100.00	100.00	68.00*	38.00
Billets, Pbgh.	19.00	19.50	19.50	20.00
Sheet bars, Pbgh.....	20.00	19.60	20.00	21.00
Steel bars, Chicago.....	1.39	1.38	1.31	1.29
Steel bars, Pittsburgh.....	1.20	1.20	1.10	1.15
Iron bars, Philadelphia.....	1.17	1.125	1.12	1.22
Iron bars, Cleveland, local del'y	1.20	1.20	1.15	1.25
Iron bars, Chgo. mill.....	1.15	1.15	1.15	1.10

*Nominal.

	Prices May 19, 1915.	Average for Apr., 1915.	Average for Feb., 1915.	Aver. for May, 1914.
Beams, Chicago	$1.39	$1.36	$1.31	$1.29
Beams, Pittsburgh	1.20	1.154	1.10	1.15
Beams, Philadelphia	1.359	1.30	1.25	1.25
Tank plates, Pittsburgh.....	1.20	1.11	1.10	1.125
Tank plates, Chicago.....	1.29	1.28	1.27	1.29
Tank plates, Philadelphia.....	1.359	1.30	1.25	1.25
Sheets, blk., No. 28, Pittsburgh	1.80	1.80	1.80	1.87
Sheets, blue an., No. 10, Pbgh.	1.35	1.30	1.30	1.37
Sheets, gal., No. 28, Pbgh.....	3.60	3.30	3.01	2.80
Wire nails, Pittsburgh.....	1.55	1.59	1.55	1.57
Connellsville fur. coke contr...	1.65	1.65	1.65	2.00
Connellsville fdy. coke, contr...	2.25	2.25	2.25	2.50
Heavy melting steel, Pbgh....	11.75	11.90	11.55	12.00
Heavy melting steel, east'n Pa.	11.25	11.25	10.50	10.75
Heavy melting steel, Chgo.....	9.25	9.30	9.44	9.94
No. 1 wrought eastern Pa.....	12.50	12.50	12.00	12.50
No. 1 wrought, Chgo.....	8.75	8.55	8.88	8.63
Rerolling rails, Chgo.....	10.00	9.85	9.62	11.25
Car wheels, Chgo.....	9.75	9.80	10.00	11.38

(For Additional Prices See Page 1038.)

Pipe Companies Buying Pig Iron

And Have Ordered Fair Tonnages—Continued Activity at Chicago—Quiet at Pittsburgh

Philadelphia, May 17.—General activity in the iron market in this territory continues of a minor character, especially in point of tonnage, though certain classes of buyers have taken on good-sized blocks in the past week. Pipe makers have led the way in this business. The United States Cast Iron Pipe & Foundry Co. is credited with having purchased 10,000 tons of low silicon grades, partly for local consumption, and the Standard Cast Iron Pipe & Foundry Co. with 6,000 tons from the same Alabama producer. The price is not given, but it is known offers of $9, Birmingham, for No. 3, by one of these buyers within the week were not attractive to makers. The leading pipe producer also is understood to have bought some lots of northern iron. Another sale of 2,000 tons of pipe forge by an eastern Pennsylvania furnace was done at about $13.50, delivered, Delaware river basis, though the iron will not go to that district. Small sales usually have marked the course of trade in the ordinary foundry grades. There are signs of considerable price irregularity in northern foundry prices due to the willingness of some producers not to hold closely to the usual distinctions in analyses of various grades. This practice of making concessions in analysis is noticeable both among eastern Pennsylvania and Virginia makers. One of the latter has been offering 2.25 per cent to 2.75 per cent silicon iron at $12.25, furnace, whereas $12.50, furnace is the common price for Virginia No. 2X. Quotations on standard northern brands average around $14.25, Philadelphia, for No. 2X. Sales both above and below this figure are being made. Waynesboro, Pa., shops have been buying some iron, one of them taking 500 tons. The Norfolk & Western railroad has inquired for about 4,000 tons of bessemer, foundry and charcoal for last half delivery at Roanoke. None of the recent basic inquiry has resulted in business. Phoenixville and Harrisburg consumers still are in the market, the latter having asked for 1,500 to 2,500 tons, and these buyers have shown a willingness to pay $13.50, delivered. War business is causing a good many orders for low phosphorus iron, but the tonnage is comparatively light and makers still are piling iron. Prices are unchanged. The Brooke furnace will go in about June 1. The Robesonia furnace is out for rebuilding.

Inquiry and Sales Better

Chicago, May 18.—Melters of pig iron continue to manifest interest in their last half requirements and inquiry still is active, although not involving as heavy tonnages as a week ago. A large portion of the inquiry active at that time has been closed and for the most part smaller tonnages are being figured now. Malleable melters continue to enter the market in a small way, but evince more interest than they have displayed for several months. Northern furnaces continue to hold prices firmly at $13, Chicago furnace, while one maker is asking $13.25, Chicago, and greater insistence than ever is being placed on silicon content, premiums being asked for this constituent whenever it exceeds the analysis for No. 2 foundry.

Southern iron is being held by most sellers at $10, Birmingham, and numerous offers of tonnages at $9.50 and $9.75, Birmingham, have been refused. Apparently some southern maker is willing to dispose of small tonnages under $10, Birmingham, as evidence of this has been met by northern sellers. As a whole, however, the market seems firm at the established quotation, although some concessions as to silicon are still being made. A Michigan manufacturer of automobile supplies has just closed for 3,500 tons, including northern and southern foun-

(*For complete prices see page* 1038.)

dry, and some high silicon iron. A Chicago maker of plumbing supplies has taken 1,200 tons, equally divided between northern and southern. As this buyer is a close observer of the market and paid $10, Birmingham, for the southern iron, and $13, Chicago, for the northern, this is evidence of firmness in the market. Furnace stocks have been reduced heavily in the past few months and at the beginning of May were more than 15,000 tons less than at the beginning of April. Some makers delivered at least double their make during April and are continuing at this rate so far in May.

Pig Iron Quiet

Pittsburgh, May 18.—The pig iron market continues inactive, so far as new sales are concerned. A 900-ton lot of bessemer was sold a few days ago at $13.75, furnace, but details of this transaction are lacking. The market for this grade has marked time at $13.60, valley, several months. Basic is being held at $12.65, but quotations have not been severely tested recently. Foundry and malleable grades are unchanged in position. This morning, the Shenango Furnace Co. blew in No. 3 stack. The company now is operating two of its three blast furnaces.

Prices Firmer at Buffalo

Buffalo, May 18.—The producing interests that have been inclined to consider concession figures, slightly below the quoted market minimum of $13 on foundry grades, are now disposed to stiffen their prices in figuring on what new business there is materializing at this time. No changes in prices have taken place on the part of the furnaces as a whole, but No. 2X foundry for last half needs is more firmly established on a $13 minimum basis.

Inquiry for malleable from several users in the eastern territory supplied from Buffalo brought out a price of $12.75, while $13 is the prevailing price for this grade. Only small and scattered lots were booked. The minimum on low grade iron has been $12.50. During the week, an order was booked for over 1,000 tons for slightly less than this figure at the furnace.

The only trading feature of the market is found in the continued buying of charcoal iron and the special higher silicon irons in small lots. The placement of foundry irons of the various better grades has been very light. A spread of $1 covers the range of prices being asked, from $12.50 as the minimum on gray forge to $13.50 as the maximum on No. 1 foundry.

Making Steady Gain

Cleveland, May 18. — One large agency reports that its sales for May promise to show a comfortable increase over those for April, which were considerably heavier than the tonnage sold in March. Its sales are such as to justify the blowing-in of another stack at an early date. Other companies report fair sales, but all agree that prices show no improvement.

Southern Iron Quiet

Cincinnati, May 17.—The pig iron market is very quiet. The majority of melters in this territory have closed for sufficient supplies to run them well into the second quarter, and the remainder are buying in small lots from time to time as iron is actually needed. The recent tendency of prices to advance to a higher level has not frightened users into buying far ahead as is usually the case. Southern furnaces have made determined efforts during the past three weeks to advance No. 2 foundry iron to $10, Birmingham basis, and have for the most part succeeded, but this grade can still be had in either Alabama or Tennessee at $9.75, Birmingham basis, for the entire second half, and a very small amount might still be placed at $9.50, Birmingham basis, for immediate shipment, if spot cash is paid. Malleable iron is not as active as it was last week, the only recent sale reported being one for 750 tons in central Ohio. Southern Ohio iron has gained no strength after its partial decline of three weeks ago, and is quoted at from $12.50 to $12.75, Ironton basis, for the last half. A lot of 2,000 tons of charcoal iron has been sold in Michigan.

$10 Seldom Shaded

St. Louis, May 17.—Pig iron inquiries again are limited to a few 100 to 200-ton lots, as were sales last week, without any indication of immediate improvement. Nearly all local agents are holding firm for $10 for southern No. 2, Birmingham basis, but in one quarter at least, a price of $9.75 can be had.

Northern iron is held at $13, Chicago, and $12.75 to $13, Ironton.

Inquiry Active

Birmingham, Ala., May 17.—Inquiry continues good and it seems that conditions in the Birmingham pig iron market are without change. No. 2 foundry is being quoted almost entirely at $10. All sales offices report that as their figure for last half delivery, although it is possible a few sales are being made at $9.75.

(*For complete prices see page* 1038.)

Still Hesitating

New York, May 18.—Some pause continues to be observed in the manner in which domestic pig iron buyers are placing orders in metropolitan and contiguous territory. How much of this is due to the critical stage which has been reached in the nation's diplomatic negotiations with Germany, is not clear, but it appears that the uncertain sentiment arising from the present situation is dictating caution and inactivity to some consumers, as the wisest plan to pursue for the moment. Comparatively little tonnage now is in the market and single inquiries usually have not exceeded a few hundred tons. The Sturtevant Valve Co., Hyde Park, Mass., has revived a former inquiry for 3,000 tons of four foundry grades, but as delivery is wanted to extend six months beyond Sept. 1, sellers are not giving very serious consideration to this proposal. The American Malleables Co. has purchased 2,000 tons of malleable for Lancaster, N. Y., for a Buffalo maker at a reported price of about $12.75, furnace. A buyer in this territory is about to come out for 1,500 to 2,000 tons of foundry and other grades. Hoboken, Newark, South Norwalk and other buyers are out for 200 to 400 tons each. Tidewater prices are unchanged at $14.25 to $14.50, for No. 2X. Notwithstanding the easier condition of ocean freights, export orders for pig iron have continued small. To Italy, 48s against 55s recently, and to the British Isles 35s against 40s to 45s recently, now are being quoted. New inquiries include 6,000 tons of hematite and 3,000 tons of No. 2 Alabama soft for Italy, and 600 tons of foundry and some other grades for Spain.

Tube Mills Fairly Active

Pittsburgh, May 18.—Scattering orders for iron and steel pipe are being placed with mills in this district. Several attractive orders for oil country goods have been awarded this week. The National Tube Co. is filling orders for 177 miles of 12-inch pipe and 28 miles of 20-inch pipe, involving 34,000 tons, for southwestern delivery.

Good Specifying

Buffalo, May 18.—Mills and agencies of the Buffalo territory announce that specifications for steel pipe are coming in in good volume. The February card prices are being maintained and jobbers report that business is good with them.

Large Tonnage of Bars

For Manufacture of Gun Barrels Sent Out by a Cleveland Company—Other Inquiries Expected

Cleveland, May 18.—An inquiry for 40,000 tons of 1-1/16-inch steel bars for the manufacture of gun barrels has been sent out by a Cleveland company which has not heretofore engaged in this line of manufacture. It is also reported that other inquiries for steel for manufacture of munitions of war are pending and will soon be sent out, and, on the whole, the bar situation is very strong. Contracting with agricultural implement makers is on the basis of 1.20c, Pittsburgh, up to Jan. 1, whereas usually in past years contracts have been made for a full year. The firmer attitude of sellers toward implement manufacturers is having good effect. The plant of the Upson Nut Co. is extremely busy and is unable to promise deliveries in less than three or four weeks. Until recently, deliveries could be given within a few days. The bar iron market is dull and prices uncertain.

Involves Heavy Tonnage.

The Westinghouse Electric & Mfg. Co., Pittsburgh, which has taken an order for approximately 1,000,000 rifles for Russia, has practically concluded negotiations for plants of the Stevens Arms Co. and Stevens-Duryea Arms Co., Springfield, Mass. The order will involve a heavy tonnage of gun steel, tentative inquiries for which are being considered. The plant of the American Locomotive Co. on the North Side, Pittsburgh, is being overhauled, but officials of the company say no war material will be made in that plant.

Ask Shrapnel Bar Tonnage

Philadelphia, May 17.—About 20,000 tons of steel rounds for shrapnel and other ammunition shells are in the market for buyers in this territory at this time. There is some question, however, whether all the business will be placed. The Bethlehem Steel Co. is asking 10,000 tons of 3½-inch rounds on which a 40 per cent crop is specified, which is not very pleasing to the mills. The inquiry which the Baldwin Locomotive Works now has out calls for only about 3,000 to 5,000 tons of 3⅛-inch rounds, but it is understood the bulk of the foreign orders taken by this company are for other shells than shrapnel. Another inquiry for 5,000 tons of rounds for shells is out for a company in this district. In more purely domestic line, the principal activity is in the placing by both jobbers and consumers of third quarter contracts for bars at 1.25c, Pittsburgh. Quite a number of such contracts have been closed in this territory. Specifications are maintained at a fair rate. Prompt and second quarter prices are firm at 1.359c, Philadelphia, or 1.20c, Pittsburgh base.

Heavy Tonnage for Shrapnel

New York, May 18.—Negotiations for 27,000 tons of shrapnel bars by the American Locomotive Co. are understood to have been closed practically, but announcement of the award is withheld, pending the settlement of some final questions of specifications. It is reported that Pittsburgh mills will supply the bulk of the order. The New York Air Brake order for 13,000 to 15,000 tons and that of corresponding size for forgings for the Westinghouse Air Brake Co. are expected to be distributed in a few days, as some points on specifications also remain to be cleared up. Other shell and shrapnel bars are in the market. These negotiations for ammunition bars completely obscure the regular channels of domestic trade, but a fair amount of business, both in new orders and specifications, is coming along. In view of the very heavy demand for large sizes of rounds for shells, some manufacturing consumers outside of the war group have been interesting themselves in ascertaining whether the mills will be so congested on certain diameters as to delay deliveries to them. Makers believe, however, that under present conditions, they can handle the demand without serious difficulty. Bar prices are firm at 1.369c, New York, or 1.20c, Pittsburgh.

Steel Bars Firm

Chicago, May 18.—Soft steel bars are the firmest product in the finished steel market. No difficulty is experienced in maintaining the price at 1.39c, Chicago mill, and excellent specifications are being made against existing contracts.

Agricultural implement makers are showing increasing interest in last half requirements, but only a few minor contracts of this sort have been closed and the larger buyers are still remaining out. The effort to limit contracts to last half instead of covering the year from July 1 to July 1 seems to have been established firmly and contracting at this time will be only to the end of the year. Reports indicate that agricultural implement makers in the east have closed more promptly for their requirements than those in this territory, but it is expected the next 30 days will see the business lined up in Chicago.

Bar Iron Prices Advanced

Chicago, May 18.—Although demand has not increased an important maker of iron bars in Chicago has advanced its quotation from 1.15c to 1.20c, Chicago mill, beginning May 17. Other makers probably will follow and establish the price shortly at 1.20c, Chicago mill. Comparatively little business is offering in bar iron and mills are operating at from 30 to 50 per cent, but conditions are pointing toward a better demand and larger specifications and the advance in price is warranted by makers who are watching developments.

Bar Market Strong

Pittsburgh, May 18.—Some makers say demand for steel bars has fallen off to a moderate extent, but bar mills, generally speaking, are producing maximum outputs. Material is being held at 1.20c for second and 1.25c for third quarter delivery, although agricultural implement makers are offered material for second half delivery on the basis of 1.20c. Bar iron is being held at 1.25c.

Active at Buffalo

Buffalo, May 18.—Bars and bar materials are the most active of the finished lines, according to the mills and agencies of the Buffalo district. Leading interests have opened their books for third and last quarter business, asking 1.25c, base, for third quarter, and 1.30c, base, for fourth quarter deliveries. Some business is being booked at these advances over the price of 1.20c, base, for second quarter. The inquiry continues fair. Orders are keeping up with the last of March and the early part of April business. Some of the mills that were previously able to assure deliveries in a week to ten days are now compelled to have from two to three weeks' time to effect deliveries.

Bar iron was advanced $1 a ton, effective May 17.

Eastern Prices Stronger

Philadelphia, May 17.—Bar iron prices in eastern Pennsylvania have firmed up considerably and some mills which a few weeks ago were reported

(*For complete prices see page* 1038.)

to be doing down to 1.05c, mill, now are holding out stoutly for 1.15c, mill. This was the minimum quotation made on carload business this week. This is the figure which some of the leading mills have been asking for some time. Volume of orders is a little better, but still is much below normal.

Hoops, Bands, Shafting

Pittsburgh, May 18.—The shafting market reflects strength. Material is being uniformly quoted at 68 per cent off for future delivery and quotations below that level for prompt delivery are disappearing. Hoops are named at 1.25c and bands at 1.20c. Demand is described as fairly heavy.

Sales of Billets

Made to English Users—Shading on Below Standard Steel

Philadelphia, May 17.—Recent sales of tonnage lots of billets to eastern Pennsylvania consumers, it is learned, brought out considerable concession in price, or to around $18, Pittsburgh basis. This business went to nearby mills and the analysis of the steel taken was considerably under standard. Some fair-sized orders for billets continue. One Richmond buyer took 1,000 tons of 2-inch billets from a Pittsburgh maker for last half and another in the same city is out for 500 tons. British buyers who were reported out last week for a total of about 10,000 tons have closed for a part of this requirement with eastern Pennsylvania makers. The tonnage was cut down considerably on final action. These billets represent a price of about £6 10s or about $31.20, delivered in the British Isles and with ocean freights now around 35s they are netting the home mills $19.50, Pittsburgh, or better. The Philadelphia market on billets is quoted at $21.56 to $22.06 or $19 to $19.50, Pittsburgh, with ordinary forging billets commanding $3 to $4 per ton higher.

Active at Pittsburgh

Pittsburgh, May 18.—Demand for semi-finished material continues active. Specifications against contracts are heavy and shipments thus far this month exceed those of the corresponding period in April, according to several makers. Larger interests are refusing to sell material for shipment after July 1, although it is believed consumers will have no difficulty in covering needs at maximum prices. Wire rods are being shipped against contracts placed on the basis of $25, Pittsburgh. Muck bar is listed at $27 Pittsburgh.

Galvanized Sheets Higher

American Sheet & Tin Plate Co. Advances Its Quotation to 3.40c for No. 28 Owing to High Price of Spelter

Pittsburgh, May 18.—Effective May 17, the American Sheet & Tin Plate Co. advanced its quotation for No. 28 gage galvanized sheets from 3.40c to 3.60c and boosted prices for other gages correspondingly. The advance, which had been expected for several weeks, is due to the advancing tendency of spelter. Some independent concerns have been quoting above 3.60c for base size. No material is being offered for future shipment. Black sheets are irregular in some sections of the country, but 1.80c seems to be the minimum of the market at Pittsburgh. Blue annealed sheets are listed at 1.35c. Specifications against contracts last week were heavier than those received in any similar period for two years, the American company reports.

Running Full in East

Philadelphia, May 17.—Eastern mill trade in sheets remains good and producers are running at full capacity. Prices do not change, however, and 1.30c to 1.35c, Pittsburgh, or 1.459c to 1.509c, Philadelphia, continue to be quoted. No change in the attitude of Pacific coast buyers who are holding off in the hope of lower freight rates, both by rail and water, is to be noted. It now is stated that the transcontinental rail rates will probably be announced by June 1.

Uncertain Prices

Cincinnati, May 18.—Quotations on galvanized sheets are very uncertain. Some mills are out of the market entirely, due to shortage of spelter, and others will only quote for prompt delivery. A substantial advance is asked for shipment up until July 1 by one maker. No. 28 gage is quoted at from 3.40c to 3.50c, Pittsburgh basis. Black sheets are selling in fair lots, but business is not as brisk as it should be at this time of the year. Black No. 28 gage are quoted at from 1.80c to 1.85c, Pittsburgh basis.

Unsettled at Chicago

Chicago, May 18.—Conditions are unsettled in the steel sheet market, with black sheets steady at former quotations with comparatively small demand and galvanized sheet makers quoting a wide range of prices. The leading independent remains constantly out of the market with a nominal quotation of 4.19c, Chicago mill, while makers in Ohio are quoting all the way from 3.25c to 3.60c, Pittsburgh, for No. 28 gage galvanized.

Warehouse prices have advanced, but still are close to mill prices.

Specifications Heavy

Pittsburgh, May 18.—Specifications for tin plate continue heavy. Mills are operating at capacity. Plants in need of additional tonnages have been booking material for immediate acceptance at low figures. An order for 8,000 boxes involving 400 tons for export has been booked by the American Sheet & Tin Plate Co.

Cast Iron Pipe

Many Private Lettings in the East—Market Quiet in the West

New York, May 18.—Salem, Mass., has entered the market for 13,068 tons of 36-inch pipe class D, bids for which are closing today. One lot is for 5,533 tons and the other for 7,535 tons, with different deliveries specified. This is the same requirement originally put out several months ago for the rebuilding of the waterworks system of that city made necessary by the disastrous fire, and the matter now has been brought to the stage of early action. St. Johns, N. B., is out for 150 tons of 24's and 36's and bids will be taken May 20 on a contractor's letting for New York, involving 735 tons of 6 to 48's. The volume of the market is good, as private buying is brisk and this is offsetting any variation in public lettings. Prices are holding to a higher level of about $22 to $22.50, New York, for 6-inch. Eastern Pennsylvania pipe foundry operations now range at about 65 to 70 per cent of capacity.

Cast Pipe is Quiet

Chicago, May 18.—Conditions are quiet in the cast iron pipe market, with practically nothing in prospect of much importance. The American Car & Foundry Co. is low bidder on 600 tons at Highland Park, Mich., on which award has not yet been made. The United States Cast Iron Pipe & Foundry Co. has been awarded 10,000 tons at Sacramento, Cal. The remainder of this city's requirements will not be placed until it is decided whether to use cast iron or steel pipe for part of the work.

(*For complete prices see page* 1038.)

Scrap Prices Are Firmer

In Some Centers, But Demand is Not Very Active— Dull at Chicago and Cincinnati

Philadelphia, May 17.—Though the volume is still laggard, prices for iron and steel scrap in eastern Pennsylvania on the whole are well sustained. The probable tonnage lot price for heavy melting steel is around $11.50, delivered. Several mills which are not in urgent need for material are offering only $11, delivered, but are receiving little steel. Borings are up and a sale of 100 tons brought $8.50, delivered. Domestic buyers in the week paid $14.25, delivered eastern Pennsylvania, for steel car axles. One leading buyer still is out to take wrought pipe at $10.75, delivered. Offerings of heavy cast in this market recently have been considerable, but price weakness has been moderate.

Ocean Freights Easier

New York, May 18.—An easier condition of ocean freights has revived interest in some of the inquiries for heavy melting steel and other grades which have been coming from Italy quite numerously. If Italian buyers will repeat recent offers of around 100s, Genoa, for steel, they probably will be able to obtain some tonnage, as this price will figure back $2 to $3 higher than the domestic market at New York. In fact, sellers will not entertain this foreign business at less than this advance over the domestic market. Demand from eastern consumers of scrap continues comparatively light and trading is quiet. Although many consumers are doing better in their melt, they do not appear disposed to increase their material under contract at this time. Prices show firmness.

Buffalo Market Stronger

Buffalo, May 18.—Dealers in the Buffalo district report a strong undercurrent that will no doubt bring about higher prices shortly in most of the lines. The improvement is particularly noticeable in cast scrap, which has been a weak factor for some little time. A number of large sales are reported pending.

A key to the anticipated changes in the market is found in the closing of the lists of the New York Central, the Pennsylvania and the Michigan Central for large tonnages, quoted in gross tons at Pittsburgh or the valley district. A price of $12 is said to have been secured for heavy melting steel. With base to Buffalo freight allowances made this is equal to $11.40 at this point, while the quoted maximum on heavy melting steel, in gross tons, f. o. b. Buffalo, has been $11.

Stronger at Pittsburgh.

Pittsburgh, May 18.—While more important consumers of iron and steel scrap are not figuring extensively in the market, yet quotations have strengthened moderately this week. Heavy melting steel offered by the Pennsylvania railroad commanded more than $12.25, or about 25 cents above the general market. A large portion of the railroad stock was taken by dealers. No great change in the situation is expected until after finishing mills increase capacities considerably.

Light Demand

Cincinnati, May 18.—The consumption of iron and steel scrap by rolling mills is heavy, but they have such large amounts to run on old contracts that they are not buying at present. Foundries are taking only small lots occasionally and demand is very light from this source. No one is buying for speculative purposes, as the tendency of the market is to remain at a standstill. Dealers have large stocks in their yards, and state that the surplus available from railroads and other sources is heavy. Heavy melting steel, cast scrap, No. 1 machine cast and No. 1 busheling are the best sellers.

Chicago Scrap Market Quiet

Chicago, May 18.—Little activity is evident in the scrap iron and steel market as consumers are taking practically no tonnage and dealers are not offering to let go of their holdings at present prices. Some strengthening has been noted here and there but large offerings by railroads and from other sources after the spring cleanup have held prices from advancing, especially in view of small consumption.

Michigan Central Railway is offering a list containing 3,000 tons, the Chicago, Milwaukee & St. Paul railway offers 3,700 tons, the Northern Pacific 2,000 tons and the Union Pacific 2,100 tons.

Prices Drop

St. Louis, May 15.—Owing to the fact that consumers of melting steel and rolling mill grades are still out of the market, and to the uncertainty of the war situation and the further fact that the railroads have been dumping large quantities of scrap on this market recently, nearly all prices have dropped from 25 to 50 cents a ton. Turnings and cast borings still are exceptionally scarce in the local market, and are bringing advanced prices.

Buying is Light

Cleveland, May 19.—The iron and steel scrap market continues apathetic. Mill buying is at a minimum. Prices have been holding fairly steady, fluctuations being over a range of 10 cents a ton, instead of the customary 25 to 50-cent swings, showing that figuring is pretty close. Local brokers look for little improvement in activity in the next two months. In the valleys, demand is slightly better than in Cleveland, but still below the level that the reported average of works' activities would seem to indicate.

Great Northern List

Chicago, May 18.—Great Northern Railway Co. has issued a scrap list containing 1,150 tons, of which 300 tons is No. 1 railroad cast and 100 tons is No. 2 railroad cast.

(*For complete prices see page* 1038.)

Manganese Ore

Coming From Brazil—Lake Ores Selling Very Slowly

Philadelphia, May 18.—Shipments of manganese ore from Brazil bound for Baltimore and aggregating about 30,000 tons are en route. This mineral is being carried in 14 schooners and craft of smaller type. A considerable part of this tonnage is for the Steel Corporation and the remainder is for other companies in this country which now are producing ferro-manganese either for their own purposes or for the market. The eastern iron ore market remains without feature. Offers of a cargo of Wabana, Newfoundland, ore brought out from consumers such low bids that no sale was consummated and the vessel which was to bring in this mineral now will come down light. Offers made by buyers on this ore show that they are not interested at present except in unusually cheap mineral. Offers made were around 5½ cents per unit at tidewater.

Lake Ore Sales

Cleveland, May 18.—Sales of ore are being made very slowly. Some firms report that they have made very few sales since the prices were announced and see no immediate prospect of improvement. Eastern buyers are showing no interest in lake ore.

Shapes to Enlarge Plants

Working on War Supplies Are a Factor in the Market—Uncertainty as to Future Holds Up Some Projects

Philadelphia, May. 18.—There is talk of some further extensions of plants working on war supplies having been quietly awarded in this territory. In fact, a requirement of several thousand tons is understood to be involved in one of these propositions now closed, but not yet announced. The 8,000 to 9,000-ton addition to the Baldwin Locomotive plant at Eddystone, awarded last week as announced then, will be fabricated both at the Pottstown and Pittsburgh shops of the fabricator, the McClintic-Marshall Co., in order to meet the quick delivery required, which is ten weeks. Eastern and Pittsburgh mills consequently will divide the plain material. Small structural orders are as numerous as ever in this district and mill bookings continue quite good, but uncertainty over the outcome of our foreign policy seems to have affected the volume in some centers, notably Baltimore and Washington. Some eastern Pennsylvania shape mills are running 70 to 75 per cent full. Occasional talk of price variations still appears, but such shading is not extensive apparently and the market as a whole remains quotable at 1.20c, Pittsburgh base, or 1.359c, Philadelphia.

Structural Future Brighter

Pittsburgh, May 18.—Several important structural projects probably will be undertaken at an early date. The approach to the St. Louis municipal bridge, requiring 24,000 tons, is expected to be definitely considered the latter part of this month. Plans for the union station at Chicago are being reconsidered in a tentative manner. The American Bridge Co. will furnish 1,250 tons for the Detroit public library. Structural shapes are firm at 1.20c for shipment before July 1, and several attractive tonnages for third quarter delivery have been sold at 1.25c. Structural mills are enjoying greater activity than they were a month ago.

April Lettings

New York, May 18.—Total structural lettings in the country during April aggregated the satisfactory figure of approximately 107,500 tons, as compared with approximately 110,000 tons during March, which had established the highest record in nine months, or since July, 1914. The April tonnage was larger than generally had been expected, as it was scarcely believed that the sharp gain in March would be maintained fully. The percentage of bookings to the total capacity in April was 62½ per cent, compared with 64 per cent in March. These figures were reported officially at the monthly meeting of the Bridge Builders' Society held at Chicago, May 14.

The reports of the Bridge Builders' society, show the percentage of capacity contracted for monthly and the approximate tonnage for each period as follows:

Month.	Per cent.	Approx. tonnage.
April, 1915	62½	107,500
March	64	110,000
February	30	51,000
January	25	43,000
December, 1914	35	60,000
November	20	35,000
October	35	60,000
September	38½	65,000
August	27½	48,000
July	68	115,000
June	56½	95,000
May	57	97,000
April	88	151,000
March	76	130,000

In this territory, small orders are numerous and the volume is holding up, but there is a limited amount of larger tonnages and of railroad work. Total lettings of the week were about 4,000 to 5,000 tons. Bids went in today on a section of the Culver elevated railroad line in Brooklyn, 14,500 tons. Shading of plain material prices, except perhaps on the most desirable and large tonnages, is not pronounced and the representative figure still is 1.369c, New York, or 1.20c, Pittsburgh.

Very Active Competition

Cleveland, May 18.—Competition on fabricating is still very active and on a job of 100 tons recently placed at Canton it is understood that an extremely low quotation was made. While the willingness of shops to submit such low bids arouses suspicion as to price paid for the plain material, mills continue to quote 1.20c, Pittsburgh, and attribute the low prices made by fabricators to the use of material from stock.

Shapes are Stronger

Chicago, May 18.—Shading on prices of structural shapes has practically disappeared and a number of contracts based on quotations made some time ago as protection in bidding have been withdrawn and the market now appears to be firm at 1.39c, Chicago mill.

After a comparatively quiet week, the tide of small orders has resumed and a large aggregate tonnage in small lots is being booked. The largest contract placed in the west during the past week was taken by the Wisconsin Bridge & Iron Co., 2,368 tons, for a bridge for the Missouri, Kansas & Texas railway. Another fair tonnage is 582 tons for the Le Moyne school building in Chicago, which was awarded to A. Bolters' Sons.

The St. Louis Bridge

St. Louis, May 18.—The board of public service again failed to advertise for bids for 24,000 tons of steel to be used in building the East St. Louis approach to the municipal free bridge, and perhaps will not ask for prices for several weeks.

CONTRACTS AWARDED.

Detroit public library, 1,200 tons, awarded the American Bridge Co.

Two dump scows, 200 tons, for United States government, American Bridge Co., low bidder.

Building for Aluminum Co. of America at New Kensington, Pa., 440 tons awarded McClintic-Marshall Co.

Building for Scoville Mfg. Co., Waterbury, Conn., 900 tons, awarded the McClintic-Marshall Co. This is an addition to 2,100 tons recently taken by the McClintic-Marshall Co. for the Scoville company.

Storage bins for the Republic Iron & Steel Co., Youngstown, 600 tons, the McClintic Marshall Co.

Bridge at Chicago for the Baltimore & Ohio railroad, 250 tons, to Chicago Bridge & Iron Works.

Buildings for the New Jersey Zinc Co., at Ogdensburg, N. Y., 500 tons, to American Bridge Co.

Lambs Club, West Forty-fourth street, New York City, 350 tons, to Milliken Bros., Inc.

Hotel for F. L. Sites, Brooklyn, 250 tons, to an independent shop.

Strathcona loft building, Thirty-first street and Fifth avenue, New York City, 600 tons to Hedden Iron Construction Co.

Storehouse, Seventy-fourth street and Seventh avenue, New York City, for Interboro Rapid Transit Co., 100 tons, to Passaic Structural Steel Co.

Bridge work for Pennsylvania railroad, 1,850 tons, 1,100 tons to McClintic-Marshall Co. and 750 tons to the Fort Pitt Bridge Works.

Additional extensions to the plant of the Scoville Mfg. Co., Waterbury, Conn., 800 tons to McClintic-Marshall Co., increasing total with that fabricator to 2,800 tons.

Apartment hotel, Rochester, 400 to 500 tons, awarded Phoenix Bridge Co.

Riverside power station, Albany, 1,000 tons, now confirmed has gone to Levering & Gerrigues.

Courthouse, Fairview, Conn., 200 tons, to the Bridgeport Boiler Works.

Men's Hotel, Rochester, taking 425 tons, by R. T. Ford Co., Rochester, steel contract to Phoenix Iron Co., Philadelphia.

Missouri, Kansas & Texas Ry. Co., through truss spans and deck plate girder spans, 2,368 tons, to Wisconsin Bridge & Iron Co.

Le Moyne school building, Chicago, Ill., 582 tons, to A. Bolters' Sons.

Coliseum Building, Seattle, Wash., 404 tons, to Northwest Steel Co.

Dallas Union Terminal Co., one 152 foot highway span for Commerce street, Dallas, Tex., 181 tons, to American Bridge Co.

Domestic Science Building for the Stout Institute, Menominee, Wis., 142 tons, to American Bridge Co.

Union Bag & Paper Co., building, Chicago,

(*For complete prices see page* 1038.)

109 tons, to Gage Structural Steel Co.

John W. D'Arcy Building, Joliet Ill., 104 tons, to Joliet Bridge & Iron Co.

CONTRACTS PENDING.

First National Bank building, Scranton, Pa., 500 tons, plans about to be issued.

Additional bridge work for the Pennsylvania railroad, 715 tons, on which bids on 600 tons go in May 25.

Loft building, Halsey street, Newark, N. J., for Third Presbyterian Congregation, 1,500 tons, bids being taken.

American Radiator Co., Pierce plant, Buffalo, foundry addition, 400 tons, bids in May 18.

Rochester Chamber of Commerce building, Rochester, George Eastman, president of Eastman Kodak Co., donor of site and building to cost $500,000. Plans being prepared; expect to build this year.

American Ship Building Co., Cleveland, foundry machine shop, 425 tons; general contract awarded Crowell-Lundoff-Little Co.

Wire Demand Increasing

Pittsburgh, May 18.—Domestic demand for wire products has improved the last 10 days. Jobbers are specifying more briskly and makers are moderately optimistic about the future. Foreign buyers are figuring in the market on an extensive scale. Inquiry is coming out from all parts of the world and fairly heavy tonnages of wire and nails are being shipped to far eastern and Mediterranean points. Nails are sold at $1.55 a keg, although the nominal price is $1.60.

Fair Specifications

Buffalo, May 18.—Specifications continue fair for wire and wire products. There is no apparent change in the market, as compared with the past few weeks. Little inquiry has appeared, as everyone seems to be covered up to July 1. Mills are able to make slightly better deliveries.

Nuts and Bolts

Pittsburgh, May 18.—Foreign demand for rivets is heavy. Several makers in the Pittsburgh district have received attractive orders for shipment to all parts of the world. While detailed information is not available, the bulk of the tonnage seems to be going to consumers formerly supplied by German interests. Numerous orders for nuts and bolts for export also are being placed. Prices are firm.

The Carnegie Steel Co., Pittsburgh, has awarded a contract to the Pennsylvania Engineering Works, Newcastle, Pa., for two hot blast stoves for No. 4 furnace of the Carnegie company at Newcastle. Several weeks ago, as previously reported, the Pennsylvania Engineering Works received a contract for numerous improvements at the Newcastle plant of the Carnegie company.

Pennsy's Cars Are Placed

Rolling Stock Ordered Will Require Fully 200,000 Tons of Steel—Rails Soon to be Distributed

New York, May 18.—Orders for 14,900 freight cars and 75 locomotives and calling for 200,000 tons or more of steel have been closed by the Pennsylvania lines east and west against its large inquiries recently circulated. This purchase of equipment is the largest made by any railroad system since that by the New York Central lines in June and July last year and its release at this time has been hailed with much satisfaction by steel makers and equipment builders. For the lines west, 1,000 automobile cars still are to be placed. The coaches, numbering about 150, also remain to be distributed. Of the locomotives, the Lima Locomotive Corporation received 25 and the American Locomotive Co. 50.

The Pennsylvania railroad within the next day or two also will distribute orders against its recent inquiry for 138,000 tons of steel rails. Rail makers, it is learned, have quoted this system $3 to $5 a ton extra over the $30 mill base price for open hearth rails to meet the requirements of the specifications. The Algoma Steel Co., which is bidding on this business, it is understood, has submitted a lower figure than the domestic mills, but whether this will be an effective point in the distribution of the tonnage, remains to be shown.

Russian car orders to the amount of 15,000 at least, still are pending, although it is generally believed that much or all of this number will go to the Pressed Steel Car Co. A report that the Pullman Co. had taken 8,000 cars and a Seattle company 2,000 cars for Russia, is denied. The American Car & Foundry Co., however, has taken 1,000 box cars, which, with the cars previously placed with Canadian shops, brings the total for Russia placed, to about 5,000. It is learned that the Canadian builders who granted better terms than the American works would entertain, now are in some doubt over the specifications that will be required for these cars and have made overtures to builders in this country as to having these filled on this side. Nothing further has been done on the matter of Russia's purchases of rails in this country.

With the award of the Pennsylvania cars, from 10,000 to 12,000 cars for other roads remain in the market. The Lake Superior & Ishpeming has revived an inquiry for 400 ore cars and will close soon. The Western Maryland is out for 16 passenger cars. The American Locomotive Co. has been awarded the conversion of 10 locomotives for the Boston & Albany and the New York Central lines are out for 40 of this type. The Bethlehem Steel Co. has taken 1,200 tons of rails for the New York Municipal Railways Corporation.

Distribution of Cars

Pittsburgh, May 18.—The Pennsylvania railroad has placed orders for 14,900 steel cars, 6,400 of which are for the lines west and the remainder for the lines east. Orders were distributed as follows: Pressed Steel Car Co., 2,500 hoppers; Standard Steel Car Co., 1,000 hoppers; Cambria Steel Co., 3,000 box; American Car & Foundry Co., 4,900 hoppers and refrigerators; Ralston Steel Car Co., 1,000 hoppers; Haskell & Barker Co., 2,500 box. The remaining 1,000 cars have not been formally awarded. The lines west have ordered 25 locomotives from the Lima Locomotive Works and 25 from the American Locomotive Co., and the western division will buy 43 passenger cars before the end of the week. Inquiries for necessary car equipment connected with the Pennsylvania order probably will be placed this week. Plates are being held at 1.20c for second quarter and 1.25c for third quarter delivery, but are not so strong as either bars or shapes.

Car and Track Equipment

Pittsburgh, May 18.—Cars ordered by the Pennsylvania railroad involve about 120,000 wheels, most of which, it is understood, will be of steel. Car wheels also are involved in pending inquiries for about 15,000 cars mentioned last week by *The Iron Trade Review*. The Pennsylvania lines west will buy from between 5,000 to 10,000 kegs of spikes and the lines east will require about 10,000 kegs for work to be undertaken the last six months of the year. Standard spikes are being held at 1.40c, although it is believed an attractive tonnage could be obtained at 1.35c.

Samuel M. Wetmore, and several other former employes of the Carbon Steel Co., Pittsburgh, will face trial again this week in the United States district court at Pittsburgh, on charges of alleged conspiracy to furnish inferior steel for use in Panama canal work. At the former trial, the jury disagreed.

(*For complete prices see page* 1038.)

More Steel for Vessels

Carnegie Steel Co. Will Furnish Shapes and Plates to Eastern Shipyards—Prices Show Less Weakness

Philadelphia, May 17.—About 6,000 tons of plates and perhaps 3,000 tons of shapes will be furnished by the Carnegie Steel Co. for two additional tank steamships awarded to eastern ship yards the past week. These boats are for the Huasteca Oil Co. and one of them was taken by the New York Ship Building Co. and the other by the Wm. Cramp & Sons Ship & Engine Building Co. These vessel awards increase to 32 the total on record placed with Atlantic yards since Dec. 1 last. More boats are pending. The Carnegie Steel Co. also will furnish about 3,000 tons of plates for pontoon construction at Norfolk for the government, which will be erected by the New York Ship Building Co. Eastern mills will supply 1,000 to 2,000 tons of plates for the Baldwin Locomotive extensions. Eastern mills are keeping up a good record of bookings and operations. War talk has not affected the well-distributed miscellaneous trade which these mills have been enjoying and the tonnage was fully maintained the past week. Some mills are up to 80 to 85 per cent of capacity, others are working full, single turn. Prices seem to be holding their own at 1.20c, Pittsburgh base, or 1.359c, Philadelphia, for delivery up to July 1.

Plates Continue Weak

Chicago, May 18.—Steel plates continue to be available on a basis of 1.29c, Chicago mill, and this product fails to gain strength with other lines of finished steel. Considerable capacity remains unfilled in small independent mills and in order to obtain tonnage these concerns are forced to take a lower price. Demand for plates continues comparatively slack and until this strengthens, prices will remain weak.

Receivers Appointed

Robert A. Carter, president, and Thomas B. Foley, representing creditors, have been appointed co-receivers for the Carter Iron Co. and the Monongahela Iron & Steel Co., Pittsburgh. Application for the appointment of a receiver was filed last week by George T. Lewis, a creditor, employed by the Carter company. The Monongahela Iron & Steel Co. owns a rolling mill at Hays Station, Pa., and is capitalized at $100,000. Mr. Lewis is a director of the concern. A majority stock of the company is owned by the Carter Iron Co., a West Virginia corporation, capitalized at $300,000. The Carter company has a rolling mill at Paden City, W. Va., and is directly interested in the Ivanhoe Furnace Co. Receivers were asked to protect the interests of the companies and the creditors.

Coke Market

Shows Activity in Contracting for Foundry Grades

Pittsburgh, May 18.—The Connellsville coke market shows no change in position. Blast furnace fuel is being held at about $1.75, ovens, for future delivery, although that figure can be shaded for next quarter shipment. The spot furnace market is comparatively quiet. The foundry coke market is active. Sales are being made at a range from $2.40 to $2.50 a ton at the ovens, but some grades are obtainable at slightly less. The *Connellsville Courier* for the week ending May 8, says production was 299,166 tons, an increase of 6,295 tons compared with the week before.

Eastern Furnace Buys

Philadelphia, May 17.—A Lehigh valley furnace has closed for about 4,000 tons of furnace coke monthly for delivery over the rest of the year, at about $1.70, ovens, though the fuel will not come from the Connellsville region. Other negotiations for furnace coke are being carried on by eastern Pennsylvania consumers.

Will Blow in Stack

Cleveland, May 18.—M. A. Hanna & Co. have purchased coke for one month's requirements for the Canal Dover stack, which will be blown in within a few days. If the coke purchased proves satisfactory, further purchases will be made. Cleveland foundries continue to contract for the last half requirements, the prevailing price being $2.40, ovens, although some coke is being sold at $2.50, ovens.

Export Inquiries for Coke

New York, May 18.—Export inquiries for coke are appearing in this market. Russia is asking for 3,000 tons of foundry coke and 4,000 tons of smelter coke for South American delivery is in the market. Considerable buying of foundry coke for shipment during the 12 months beginning July 1 is being done by domestic consumers in this and adjacent territories. One contract calling for 6,000 tons has been closed and an inquiry for 5,000 tons is pending. Other foundry coke contracts made in this New England and Eastern Pennsylvania territory within the past week reached about 10,000 tons. These transactions usually have involved the best grades of 72-hour coke, and have been made at $2.40, Connellsville basis.

Prices Stiffer

Cincinnati, May 18.—The foundry coke market is active. Prices are a little stiffer, but they have not changed. Foundries are beginning to buy for next year's requirements, with contracts to expire about July 1, 1916. Wise county foundry coke is quoted at from $2.25 to $2.50 for contract shipment, Pocahontas foundry at from $2.10 to $2.35, and New River foundry at from $2.50 to $3. There is no activity in furnace coke.

Several Contracts

St. Louis, May 17.—A sale of 3,000 tons of foundry coke last week is reported by one local sales agent, and several contracts, due about this time of the year, have been closed for small tonnages. Foundry coke ranges from $2.25 to $2.50, Connellsville and Virginia ovens.

Ferro Prices

Will Probably be Advanced—All Offers at $88, Seaboard, Withdrawn

New York, April 18. — Prices of English ferro-manganese appear to be on the verge of another sharp advance, as sellers have been advised by their principals effective May 14, to withdraw all offers at $88, seaboard. In fact, it now is currently reported that some sellers are quoting $98, seaboard, or $10 a ton higher, but it is not yet confirmed that this is the official schedule. Some direct sellers at least have received no authority to resume quoting and still await the new schedule. If the $98 seaboard price prevails, this alloy will be $30 a ton higher than was quoted at the time the embargo was established by the English government last November. Successive advances of $10 a ton were made on March 3 and April 30. The repeated advances are attributed to the higher market on manganese ore and to the increasing desire of English makers to conserve their stocks of this mineral. No early relief in the manganese ore situation, apparently, is counted upon from the forcing of a passage through the Dardanelles, which would provide an outlet for Russian material.

English producers in the week de-

(*For complete prices see page* 1038.)

clined some offers of additional business at $88, seaboard, for forward delivery. Spot ferro-manganese continues to command around $100 a ton at the plant of the seller. A sale of 100 tons by an eastern steel maker at this figure was made within the week. Ground and small lots of lump ferro-manganese are quoted at 6 to 6½ cents per unit at the plant.

The modification agreed to by the British admiralty to the objectionable No. 4 clause in the formal guarantee required of consumers, as stated in *The Iron Trade Review* last week, it develops, involves the insertion of the phrase: "To any place in Europe, other than the United Kingdom, France and Russia." The revised clause now reads that the recipient agrees "that he will not sell to any person in the United States any steel in the manufacture of which the said ferro-manganese has been employed without obtaining from him a written undertaking that the same is not to be exported from the United States to any place in Europe other than the United Kingdom, France and Russia and satisfying ourselves that he will carry out such undertaking." This change has satisfied some consumers who have held off from signing pledges and they now have executed these instruments. The revision, however, still leaves unsettled the main contention of American consumers that it is practically impossible to comply with the strict letter of the requirement.

New arrivals of ferro-manganese from England the past week totaled only about 600 tons, practically all of which was aboard the Asian, which arrived at New Orleans May 16. Sellers have been advised that shipments under May licenses now are being loaded.

Steel makers continue to give considerable attention to spiegeleisen and some further sales of 500 ton size of domestic have been made. That some large steel makers feel easier on the general situation on manganese alloys is shown by their declining to take up heavy additional tonnages which have been under option, at attractive prices.

There is considerable demand for bessemer ferro-silicon. An equipment manufacturer is out for 300 to 500 tons for western delivery. An eastern Pennsylvania steel maker took 200 tons of 11 to 12 per cent. Prices seem a little firmer and some makers are asking $1 higher than recently. A foreign inquiry for 500 to 1,000 tons of fluorspar is out.

Price Withdrawn

Pittsburgh, May 18.—Pittsburgh sellers of ferro-manganese are awaiting further advice concerning prices for future delivery. The withdrawal of the $88, seaboard, figure leads to the belief that the quotation for contract delivery is to be advanced. Fifty per cent and lower grades of ferro silicon are in fairly good demand, but no change in price is noted. Ferro-tungsten has been advancing in price, but no definite figures are offered by sellers. Ferro-molybdenum and ferro-carbon titanium are unchanged in position.

Spelter Excited

Owing to Heavy Demand—Consumers Willing to Pay High Prices

New York, May 18.—The spelter market is active and excited as the result of a big demand which commenced last Saturday. Since then at least 10,000 to 15,000 tons have been sold. These sales involved all grades, but principally prime western, and were made mostly to domestic consumers, with the exception of some large tonnages that were entered for shipment to Russia. Large domestic consumers continue to scour the market and there are some good foreign inquiries in the market, so that the present activity promises to continue. Just where all this spelter is to come from is a matter of conjecture since prime western is sold up practically through July and the better grades even farther ahead, and a large proportion of the current inquiry involves prompt and nearby shipment. The feature of the present buying movement is that domestic consumers are more willing to cover ahead at present prices. As high as 13.50c to 13.75c has been done on futures. At present, futures are held somewhere between 13.75c and 14.25c. Prompt and June are about 14.50c to 15.50c, but some talk is heard of 16c. The price of sheet zinc has been advanced to 18.50c.

The copper market continues exceedingly strong by reason of the big war demand. Electrolytic is held by first hands at no less than 19c, delivered 30 days. Casting copper of good quality is held at 18.25c to 18.50c, delivered 30 days; ordinary casting is held as low as 17.25c, cash New York. The best lake copper has sold at 23c to 24c, cash. Ordinary lake is held at about 19c to 19.12½c, cash, and arsenical lake at 18.75c to 18.87½c, cash.

The New York office of John Caine, Philadelphia, dealer in iron and steel scrap, V. Horton representative, has been moved from 114 Liberty street to Room 1120, 90 West street.

(*For complete prices see page* 1038.)

Death of George H. Russel

George Howard Russel, president of the People's State bank of Detroit and a former president of the American Bankers' Association, died at his home in Detroit, May 17, at the age of 67 years.

Mr. Russel was born in Detroit and at the age of 16 entered the employ of the Gaylord Iron Co. Later he became yard foreman of the Detroit & Lake Superior Iron Mfg. Co., and in 1868 was made secretary and treasurer of the Detroit Car Works and the Hamatramck Iron Works. In 1878, with Walter S. Russel, he organized the Russel Wheel & Foundry Co., of which he became president. Later he became interested in banking and in 1889 was elected president of the State Savings bank, which was consolidated with the People's Savings bank, of which he was chosen president.

Mr. Russel also was vice president of the Russel Wheel & Foundry Co., the Great Lakes Engineering Works, and a director of the Union Trust Co., of Detroit, and the American Car & Foundry Co. of New York. In 1898, he was elected president of the American Bankers' Association. He is survived by a widow and three children.

Dr. George B. Russel, father of George H. Russel, early in life became interested in manufacturing matters and was instrumental in founding the American parlor car and sleeping car system, which has revolutionized long distance traveling not only in America, but throughout the world. He associated with him Geo. M. Pullman, and together they built the first Pullman car building plant at Detroit, the success of which was due largely to the energy, ability and foresight of Dr. Russel. The Pullman works later were removed to Chicago and the Detroit plant passed into the control of the Detroit street railway company.

Developing Manganese Property.—H. P. Binswanger, of 30 East Forty-second street, New York City, now is engaged in developing the Powell's Fort manganese property in the Shenandoah valley, 11 miles from Woodstock, Va. This work is under the supervision of J. Carson Adkerson, an engineer of Lynchburg, Va., who has been connected with the Piedmont Manganese Corporation of Concord, Va., and with its successor, the Oxford Mining & Manganese Corporation. The Powell's Fort mine produced pyrolusite ore for many years. It now is planned to develop the veins of manganese ore which traverse the property.

Railroads Are Justified

In Making Five Cents Dock Charge for Handling Ore Shipped From Michigan and Wisconsin Mines

Washington, May 18.—Holding that the railroads were justified in increasing their ore rate from 40 to 45 cents per gross ton from the Gogebic, Menominee and Marquette ranges in the Michigan peninsula to the ports of Ashland, Wis., and Escanaba and Marquette, Mich., the interstate commerce commission today handed down an opinion and dismissed the complaints against the increased charges. The complainants were the Hayes Mining Co., the Newport Mining Co. and Corrigan, McKinney & Co. At the same time, the commission dismissed the complaint of the Newport Mining Co. that the system of grouping all the mines in the Gogebic and Menominee ranges and applying to all mines alike the blanket rate of 45 cents, resulted in unjust discrimination prejudicial to it.

The increased rate was brought about when the carriers, in January, 1913, serving Michigan mines, filed supplementary tariffs separating their charge on ore traffic and applying a 5-cent per gross ton additional charge for dock service, but keeping in effect the old rate of 40 cents which then applied only for the service of assembling and line haul up to the dockyard. The commission said that the effect of this change was to increase the rate for service formerly performed at a lower rate and that the carriers had satisfactorily discharged the burden placed upon them of justifying the increase. In view of the recent decision in the Lake Superior ore rate case, when the rate was cut only 5 cents per ton, from 60 to 55 cents, it had been predicted that the commission would justify the Michigan rate increase. Ore hauled from the three Michigan ranges in 1913 totaled 13,508,852 tons, as compared with only 8,883,596 tons in 1914.

The opinion incorporates a statement compiled by *The Iron Trade Review* in its Lake Superior ore annual for 1913 showing the prices of ore in connection with the claim of the carriers that the profits accruing to the operators was such that they could easily stand the small increase in the rate which had been made.

Takes Over Business.—The Whiting Foundry Equipment Co., Harvey, Ill., has taken over the foundry equipment business of the Central Iron Works, Quincy, Ill., adding to its line of dust arresters and water cinder mills formerly manufactured by the Quincy company. The Whiting company has retained one of the engineers of the Central Iron Works on exhaust system equipment. The company is prepared to furnish repairs for Central Iron Works equipment.

Steady Increase

In Exports of Iron and Steel Products—More Ore Being Imported

The steady increase in exports of iron and steel products is shown by the government report for March and for the nine months ending with March. The exports for March amounted to 174,311 tons, compared with 144,363 tons in February and 139,788 tons in January, while the exports in March, 1914, were 159,994 tons. Comparing March of this year with March of 1914, the principal increases in tonnage were in semi-finished steel, steel bars, hoops and bands, tin and terne plate and wire products.

IRON AND STEEL EXPORTS, GROSS TONS

	March, 1915.	March, 1914.	Nine months ending March, 1915.	Nine months ending March, 1914.
Scrap	1,068	2,578	14,695	59,390
Pig iron	7,263	11,043	73,716	164,336
Billets, ingots, and blooms of steel	26,410	4,235	81,705	29,931
Wire rods	10,730	8,333	54,098	30,348
Steel rails	11,420	25,196	94,403	282,681
Steel bars	17,296	10,337	118,880	118,155
Iron bars	556	632	4,624	9,283
Struc. iron and steel	16,943	20,550	118,976	245,813
Hoop, band and scroll	2,469	567	9,676	8,623
Sheets and plates	23,356	33,418	181,707	286,239
Tin and terne plates	10,499	3,578	56,349	30,052
Barbed wire	15,131	6,164	88,562	60,801
All oth. wire	13,926	9,137	82,899	63,547
Cut nails	75	583	1,431	3,187
Wire nails	3,757	2,674	33,786	28,149
All oth. nails includ. tacks	555	224	2,976	2,390
Pipes & fit.	9,626	18,052	121,524	188,239
R. R. spikes	673	652	4,369	6,072
Bolts, nuts, riv. washers	1,050	1,640	9,425	15,474
Horseshoes	1,386	125	7,414	945
Cast radiators	122	276	4,614	2,159
Total	174,311	159,994	1,165,829	1,635,814

Imports continued light, being only 8,025 tons in March, compared with 27,875 tons in March, 1914. In February the imports were 7,505 tons and in January, 10,569 tons.

Imports of iron ore are increasing, being 88,402 tons in March, compared with 78,773 tons in February and 75,286 tons in January. The imports in March, 1914, were 68,549 tons.

Exports of commercial automobiles show an increase in March, with a total of 1,339 cars exported, valued at $4,725,563, compared with 1,002 in February, 1915, valued at $3,022,482 and only 50 in March, 1914, valued at $63,932. Passenger automobiles show an increase over February, 1914, but a decrease compared with March, 1914, the figures being as follows: March, 1915, 2,429, valued at $1,958,302; February, 1915, 2,230, valued at $1,785,330; March, 1914, 3,538, valued at $2,984,915. Machinery exports for March, 1915, were valued at $10,053,895, compared with $7,936,467 in February, 1915, and $9,588,274 in March, 1914, while machine tools again show an increase, the figures being $3,863,913 for March, 1915, $2,523,722 for February, 1915, and $1,075,896 for March, 1914. Agricultural implement exports show an increase over February, but a decrease compared with March of last year. The exports for March, 1915, were valued at $1,567,327, for February, 1915, $762,606, and for March, 1914, at $4,726,790.

IRON AND STEEL IMPORTS GROSS TONS.

	March, 1915.	March, 1914.	Nine months ending March, 1915.	Nine months ending March, 1914.
Scrap	1,847	5,640	25,303	26,751
Pig iron	2,947	11,336	84,813	93,938
Ingots, blooms, billets of steel	1,001	4,333	21,463	25,327
Wire rods	765	1,133	3,471	9,471
Rails	430	637	15,691	10,422
Bar iron	634	933	10,516	18,202
Structural	187	763	5,363	7,117
Sheets and plates	161	342	2,317	1,843
Tin and terne plate	53	2,758	4,608	18,813
Total	8,025	27,875	173,545	211,884

IRON ORE IMPORTS, MARCH

	Tons 1915.	Tons 1914.
Spain	.....	6,015
Sweden	6,410	11,997
Canada	134	3,388
Newfoundland and Labrador	.....	.....
Cuba	57,920	45,400
Other countries	23,938	1,749
Total	88,402	68,549

Exports of zinc and manufactures of, except ore and dross, were valued at $1,251,132 in March, 1915, compared with $2,089,399 in February, 1915, and $29,171 in March, 1914.

The Browning Co., Cleveland, has received an order for a locomotive crane for the Alaska railroad. The crane will be made up here and shipped to Alaska, going from Seattle to Alaska by boat. The Browning company has shipped to the United States engineer at Wheeling, W. Va., a 20-ton locomotive crane to be used in Ohio river work.

Mary furnace of the Ohio Iron & Steel Co., Lowellville, O., was blown in recently, after being extensively repaired. The stack will furnish some iron for the Youngstown Sheet & Tube Co., Youngstown.

MEN OF THE IRON TRADE

Who they are **Where they are** **What they are doing**

Edward Ehlers, president of the Rockaway Rolling Mill, Rockaway, N. J., has returned from a two months' vacation in California.

E. A. Stillman, president of the Watson-Stillman Co., 50 Church street, New York, left London on the Adriatic on May 12, due to arrive at New York on May 20.

A. W. Van Buren, for 17 years with the Chicago office of the Niles-Bement-Pond Co., has associated himself with the E. L. Essley Machinery Co., Chicago, as salesman in the Chicago territory.

D. O. Rogers, vice president of the Skinner Chuck Co., New Britain, Conn., and one of the leading citizens of that place, who has been seriously ill with an attack of the grip, is reported as convalescing.

Chas. Spalding, previously located at the Chicago office of the Gisholt Machine Co., Madison, Wis., now has headquarters in Detroit. He will continue to handle business in the Chicago territory.

F. C. Severin, formerly Birmingham, Ala., salesman for the Niles-Bement-Pond Co., Inc., has been transferred to the New York office of the company and will cover a portion of New York state.

F. W. Parker has joined the sales force of the Quasi-Arc Weldtrode Co., 61 Broadway, New York. Mr. Parker for many years was with Niles-Bement-Pond Co., Inc., but lately had been engaged in the wrought iron castings business.

John D. McCue, of the contract department of Russell & Erwin, division of the American Hardware Corp., New Britain, Conn., will become manager of the builders' hardware department of the Hotchkiss & Templeton store in Waterbury, Conn., May 15.

James A. Campbell, president Youngstown Sheet & Tube Co., has been elected president of the Youngstown Chamber of Commerce, Youngstown, to succeed J. G. Butler Jr., who has served as head of the organization for eight years. The growth of the organization is due largely to the efforts of Mr. Butler.

Elmer H. Fish, of Worcester, Mass., who, for the past year has been on the editorial staff of the *American Machinist*, New York, previous to which time he was the director of the boys trade school in Worcester, has accepted the position of supervisor of the educational department of the Norton Co., and Norton Grinding Co., of that city.

George J. Danz has been elected president of the Hofius Steel & Equipment Co., Seattle, Wash. Other changes in officers are: M. A. Arnold, vice president; Philip Kitchin, secretary and treasurer; James F. Howie, general manager. These changes were made necessary by the retirement from the company of A. A. Hilton and the death of W. W. Williams.

Clarence S. Lomax, general superintendent the Lehigh Coke Co., South Bethlehem, Pa., read a paper on "The Development of By-product Coke for Foundry Practice" at the regular monthly meeting of the Pittsburgh Foundrymen's association at the Fort Pitt hotel, May 17. Mr. Lomax briefly described operating methods employed in by-product oven practice.

E. R. Wendemuth, who for several years has been assistant manager of the New York office of the Pacific Hardware & Steel Co., has been appointed manager of the Pittsburgh office of Oliver Bros. Purchasing Co., 71-73 Murray street, New York City. Mr. Wendemuth succeeds Joseph V. Smith, who resigned to become manager of Hubbard & Co.'s shovel department.

President H. C. M. Thomson of the American Hardware Corp., New Britain, Conn., is on a business and pleasure trip to San Francisco, which will include a visit to the two expositions. No action will be taken in regard to the filling of the vacancy in the treasurership caused by the death of Charles E. Wetmore until his return. It is believed that Isaac D. Russell, the assistant treasurer, will be elected to succeed him.

George T. Reiss, vice president of the Niles Tool Works Co., Hamilton, O., and a director of the Niles-Bement-Pond Co., New York City, died at his country home near Hamilton, May 5. Born in Cincinnati, Dec. 6, 1849, Mr. Reiss went to Hamilton in 1877, where he secured employment as a draftsman at the Cope & Maxwell shops. In 1878, in the capacity of master machinist, he was placed in charge of the engineering department of the Niles Tool Works Co. Subsequently he was appointed chief mechanical engineer, later becoming superintendent of the drafting department. Upon the death of the late Col. Alexander Gorden and the accession of James K. Cullen to the presidency, Mr. Reiss was elected vice president, which position he held until his death. Due to his inventive genius, the equipment built by this company takes high rank in machine shops generally, particularly those engaged in heavy work. Notwithstanding his active business life, Mr. Reiss always was interested in the public affairs of the community in which he lived.

H. L. Hopwood, former secretary of the Kenton Commercial Club, Kenton, O., has accepted a position with Webber, McCoy & Jones, a firm of lawyers at Columbus, O., where he will have charge of an industrial department established to assist in the organization and reorganization of corporations and the sale of industrial plants, and to co-operate with the chamber of commerce in bringing new concerns to Columbus by helping to finance them. Mr. Hopwood is a graduate of law school of Ohio State University.

Steel Making Iron Bought

Pittsburgh, May 19. (By wire.)—A bessemer consumer in this district has bought 3,000 tons last half iron from a new nearby furnace at $13.75, furnace. Sales of this grade continue to be made at $13.60, valley. It develops that a steel company in this district a week ago closed for 10,000 tons of standard basic at the current market price.

Sells Plants

The Reading-Bayonne Steel Casting Co., with plants at Reading, Pa., and Bayonne, N. J., has disposed of its Bayonne plant to the Bayonne Steel Casting Co. and the Reading plant has been sold to the Reading Steel Casting Co. The officers of the Bayonne Steel Casting Co. are: W. D. Sargent, president and treasurer; H. E. Pollard, sales manager; A. J. Passino, secretary, and Charles Lidstone, superintendent. The officers of the Reading Steel Casting Co. are as follows: J. Turner Moore, president; M. G. Moore, vice president and sales manager; H. M. Doty, secretary and treasurer, and J. Douglas Gehgor, superintendent.

News of Employers and Employes

Walter Drew Severely Criticises the Efforts of the Labor Department to Establish the Closed Shop—Makes Strong Points

Washington, May 18.—Directing sharp shafts at methods employed by organized labor, and pointing out that the first great legal fact in connection with the trade union, because of its being a voluntary, unincorporated association, is that it is not legally responsible in a suit for injuries which it may unlawfully inflict upon others, Walter Drew, general counsel for the National Erectors' Association, testified yesterday before the United States commission on industrial relations. His statement, incisive, yet moderate, became all the more emphatic and impressive because of its punctilious regard for facts, legal and otherwise, in striking contrast to extravagant assertions which have been made recently by labor agitators, endeavoring to obtain a melodramatic effect.

Mr. Drew's statement dealt with the attitude of the courts in labor cases, of labor toward the law, and protection of constitutionally guaranteed rights. Summarized, he told that the principle and remedies which apply to labor combinations and their conduct, and the function of the courts in their administration, are found to be precisely the same with respect to combinations of labor as to other combinations; that the boycott is the chief weapon of modern unionism and also characteristic generally of its spirit and methods; that there has come a determined and systematic effort on the part of closed-shop unionism to break down the protective power of the courts of equity, and that with the growth in the power of the militant union and with the increasing use of its war measures has naturally come a greater need for the exercise of the power of injunction.

He said that, despite the awful dynamite outrages of the structural iron workers' union, its treasury cannot be reached by any known action at law to recover damages for the injury inflicted. In the Danbury hatters' case, he asserted, it seems not to be generally known that the original action was begun against hundreds of the individual members of the hatters' union because of this same immunity of the organization itself from legal liability.

"Power without corresponding responsibility—this fact is, in my judgment, the one most fundamental fact connected with the legal status of the union," said Mr. Drew. "What human institution can successfully endure possession without responsibility? What more dangerous millstone to be hung about the neck of a labor organization in its upward climb to its proper place in society and in industry? In recent history, what one thing has retarded the growth and development of trade unionism along right and proper lines so much as the reckless and lawless conduct of those who have achieved its leadership, and why is not the possession of immense power without corresponding responsibility the direct cause of reckless leadership?"

Establishing Responsibility

It was declared that the establishment of the trade union upon a proper basis of legal responsibility could be accomplished by incorporation of the union through its own initiative under the federal or state acts permitting such incorporation, or it could be accomplished by the passage of laws permitting actions for damages for either tort or breach of contract to be brought against trade organizations in their own names, and making any judgment secured collectible out of the funds of the association. He said, however, the fact of legal irresponsibility, which seems to be so little understood by the general public, is evidently keenly appreciated and understood by the union leaders, who have no intention of relinquishing its obvious advantages.

Mr. Drew sharply criticized the attitude of the department of labor as now constituted. He pointed out the investigation made by John Moffitt, as representative of Secretary Wilson, into the recent strike of the boilermakers' union in the Oklahoma oil fields. Mr. Moffitt, said Mr. Drew, suggested a method of settlement with the American Erectors' Association by which the latter would enter into a closed shop agreement with the union, involving, of course, the placing of the union back in the same power and control as it previously occupied and involving the discharge of such of the employes of the contractors as could not, or would not, secure membership in the union.

"I believe it to be a fair subject of inquiry on the part of this commission," said Mr. Drew, "whether it is a proper function of the department of labor to exert its power and its influence in the assistance of trade unions to secure closed shop contracts, especially under such circumstances." This case was said to be typical of the general conduct of the department of labor in its attitude in labor controversies. Mr. Drew also pointed out the unfair attitude of organized labor to non-union workers.

Davenport's Testimony

Attorney Daniel Davenport, Bridgeport, Conn., general counsel for the American Anti-Boycott Association, who prosecuted the case against the Danbury hatters for D. E. Loewe & Co., Danbury, Conn., hat makers, expressed the opinion that after the Supreme Court's decision in that case additional legislation was made unnecessary. Courts were defended by Mr. Davenport against the charge of bias against labor. He also supported the injunction and the position taken by the employers and legal conduct of the Danbury hatters' case. Chairman Frank P. Walsh asked Mr. Davenport who the members of the Anti-Boycott Association are, but Mr. Davenport declined to say, explaining that the identity of his clients is a matter of confidence and privilege, and saying some of the members would fear the wrath of labor unions.

Wilson Denies It

Washington, May 19. (By wire.)—Commissioner O'Donnell, of the United States commission on industrial relations yesterday read a statement from Secretary of Labor Wilson denying the charges made by Walter Drew, counsel for the National Erectors' Association, during the latter's testimony Monday. Secretary Wilson denied that the department is being used to force the closed shop upon employers. He says it merely acts as provided by the organic act as a mediator to settle labor trouble and to foster workers' welfare. Referring to the charge of Mr. Drew that John Moffitt, department mediator, suggested a settlement of the boilermakers' strike in Oklahoma by the acceptance of the closed shop agreement, Mr. Wilson said the opposite was true, Moffitt having suggested that union officials accept the open shop.

Damage Suit

Resulting From Cancellation of Ore Contract is on Trial

The suit for $70,000 damages brought by Swallow & Hopkins, owners of the Helmer mine, near Buhl, on the Mesabi range, against the Iroquois Iron Co., South Chicago, is in progress at Duluth, in the district court.

In December, 1912, M. A. Hanna & Co., acting as agents for Swallow & Hopkins, sold 100,000 tons of Mesabi non-bessemer iron ore to the Iroquois Iron Co., at $3.40, delivered at South Chicago, the regular market price for that grade of ore. One clause of the contract provided that if two consecutive cargoes of ore shipped from the mine analyzed less than 50 per cent iron natural, the Iroquois company would have the right to cancel the contract. After 14,000 tons had been shipped and the last cargo had fallen slightly below 50 per cent natural in iron, with 14 per cent moisture, the plaintiffs claim that by telephone they notified the defendant that another cargo of ore was ready to ship which would also probably analyze less than 50 per cent iron and that they did not wish to ship this ore. They claim that Edward Raum, assistant secretary of the Iroquois Iron Co., then authorized the shipment of the ore. This is denied by Mr. Raum.

On the part of the plaintiffs, it was claimed that the last shipment of ore to the Iroquois Iron Co., 4,600 tons, was less than a cargo, and that as only a cargo and a part of a cargo had been shipped, and as the defendants had waived their right to cancel the contract, the contract could not be legally cancelled. F. B. Richards, manager of sales of the iron ore and pig iron department of M. A. Hanna & Co., testified that after the Iroquois company refused to take the 86,000 tons which had not been shipped, he trid to sell that tonnage, but received no offers.

"Was there even a nibble?" inquired William D. Bailey, attorney for the plaintiffs.

"Yes," replied Mr. Richards, "one consumer said he might take 11,000 tons at $2.75, but he decided not to do it and we were unable to sell any of the ore."

David T. Croxton, president of the Cleveland Furnace Co., was examined at length as to the undesirability of iron ore high in moisture. He said that iron ore running 14 to 16 per cent in moisture frequently causes serious delay in handling and increases the cost of manufacturing pig iron. D. B. Meacham, of Rogers, Brown & Co., gave similar testimony. William Rattle, of W. J. Rattle & Son, Cleveland, testified as to the analysis of the last two shipments of ore. Considerable testimony was heard as to what constitutes a cargo, the plaintiffs holding that a cargo is a full boat load, while the defendants maintained that every shipment is considered a cargo and there might be a number of cargoes in one vessel.

George Smart, editor of *The Iron Trade Review*, testified concerning the prices of iron ore published in *The Iron Trade Review* from Nov. 19, 1912, the date of the beginning of the buying movement for 1913, until the end of the year 1913, the quotation on Mesabi non-bessemer throughout that period being $3.40. He said that if a few sales had been made at less than that price, they would not justify changing the regular quotation.

"Would you say that after the buying movement ended, sales could have been made at $3.40?" asked Mr. Bailey.

"No sir," was the reply.

A telegram from Duluth to *The Iron Trade Review* states that it was expected that the taking of testimony would be finished Wednesday and the case submitted to the jury Thursday.

Ex-Presidents

Elected Honorary Members of Pittsburgh Foundrymen's Association

Robert Taylor, William Yagle and J. S. Seaman, the first three presidents of the Pittsburgh Foundrymen's Association, were elected honorary members of that organization May 17, at the regular monthly meeting at the Fort Pitt hotel, Pittsburgh. Mr. Taylor, who was connected with the Taylor-Wilson Mfg. Co., McKees Rocks, Pa., until a few years ago, was president of the society the first year of its existence. Mr. Yagle, who succeeded Mr. Taylor, owned a foundry in Pittsburgh for many years. Both he and Mr. Taylor have retired from active business.

Mr. Seaman, known throughout the foundry and allied trades as "Daddy" Seaman, is actively connected with the Seaman-Sleeth Co., Pittsburgh. Major J. T. Speer, chairman of the Pittsburgh Valve Foundry & Construction Co., in paying a tribute to Mr. Seaman, referred to him as the "Daddy" of the American Foundrymen's Association. "He started in business in 1869, when Pittsburghers went to work in steamboats, and is still in the harness," Major Speer said. Mr. Seaman outlined some of the experiences he had when 2-ton castings were considered large.

Mr. Yagle gave a brief history of the Pittsburgh association.

Great Work

Of the Late Frederick W. Taylor Will Be Continued by Friends

The great work along the lines of industrial efficiency instituted and carried on so ably by the late Frederick W. Taylor is to be perpetuated and advanced by a committee of four known as the Frederick W. Taylor Co-operators.

To conserve his work it has been arranged:

To provide for the continuation and extension of the Taylor system of management.

To gather such materials as may be of use to his biographer.

To answer the correspondence which of late years has been coming in in increasing volume from all parts of the world.

To complete the collection of books, data and memorabilia which would supply material for any memorial to Mr. Taylor.

This committee consists of the following: Carl G. Barth, Morris L. Cooke, James Mapes Dodge and H. K. Hathaway.

In addition, an advisory board has been appointed as follows: Clarence M. Clark; Wm. Crozier, U. S. A.; Henry L. Gantt; Edwin F. Gay; C. F. Goodrich, U. S. N.; Y. Hoshino; Toro Ishiki; Henry Le Chatelier; Wilfred Lewis; Harlow S. Person; R. Poliakoff; Hans Renold; Ida M. Tarbell; Sanford E. Thompson; Henry R. Towne, and A. Wallichs.

Will Install Electric Furnace

The Dayton Steel Foundry Co., Dayton, O., has recently placed an order for a 1-ton Snyder electric furnace. This furnace will melt and refine cold scrap on a basic lining, producing refined steel castings. The Dayton Steel Foundry Co. is chiefly a manufacturer of high grade steel castings for the automobile and machinery trade. The Snyder electric furnace is built according to Snyder patents by the Snyder Electric Furnace Co., 53 W. Jackson Blvd., Chicago.

The Alliance Machine Co., Alliance, O., has received orders for four 10-ton electric cranes for the Homestead Steel Works of the Carnegie Steel Co. The Alliance company also has taken an order for an electric charging larry for installation at the by-product coke oven plant of the Cambria Steel Co., Johnstown, Pa.

The Lorain Steel Co. is filling an order at its Johnstown, Pa., plant for 1,200 tons of rails for shipment to traction line interests in Winchester county, N. Y.

New Ore Unloaders at Philadelphia

Description of New Type of Unloading Machines, Used for First Time on Eastern Seaboard

THE third iron ore unloading plant to be built on the eastern seaboard was completed recently at the Girard Point terminal of the Pennsylvania railroad at Philadelphia. It was erected by the McMyler Interstate Co., Bedford, O., and is the first plant of the McMyler type to be installed in the east. Those previously erected are at Sparrows Point, Md., and at the Port Richmond terminal of the Philadelphia & Reading railroad at Philadelphia, and are of the Brown type.

The Girard Point plant is the property of John Grace's Sons, master stevedores, Philadelphia, who operate under an arrangement with the Pennsylvania railroad. The plant comprises two unloading machines, which are located on a 1,000-foot pier. Each machine is provided with a three-ton grab bucket and a two-ton scoop bucket, the former of the self-filling, and the latter of the hand-filled type.

A feature of these machines, is that separate rope mechanisms are provided for operating both buckets. Thus, after the bulk of the ore has been removed from the hold of a vessel by the grab bucket, the scoop is brought into use immediately for trimming up the hold. In this manner, time is saved which otherwise would be lost in alternately connecting and disconnecting the buckets to and from the ropes. When not operating, the buckets are suspended from hooks in the tower, eliminating strain on the ropes and engines.

FIG. 1—ORE UNLOADING MACHINE OF McMYLER TYPE

Power for operating the grab bucket is furnished in each machine by a double-cylinder, 13 x 16-inch, hoisting engine, a double-cylinder, 9 x 12-inch, trolley engine and a 125-horsepower boiler, while for operating the scoop bucket a 9 x 12-inch, double-cylinder, hoisting and trolley machine is provided, also driven by steam from the boilers. The engines and boilers are quartered in separate rooms which are built up on the machinery floor of each machine. Each machine is equipped with an auxiliary hoist and

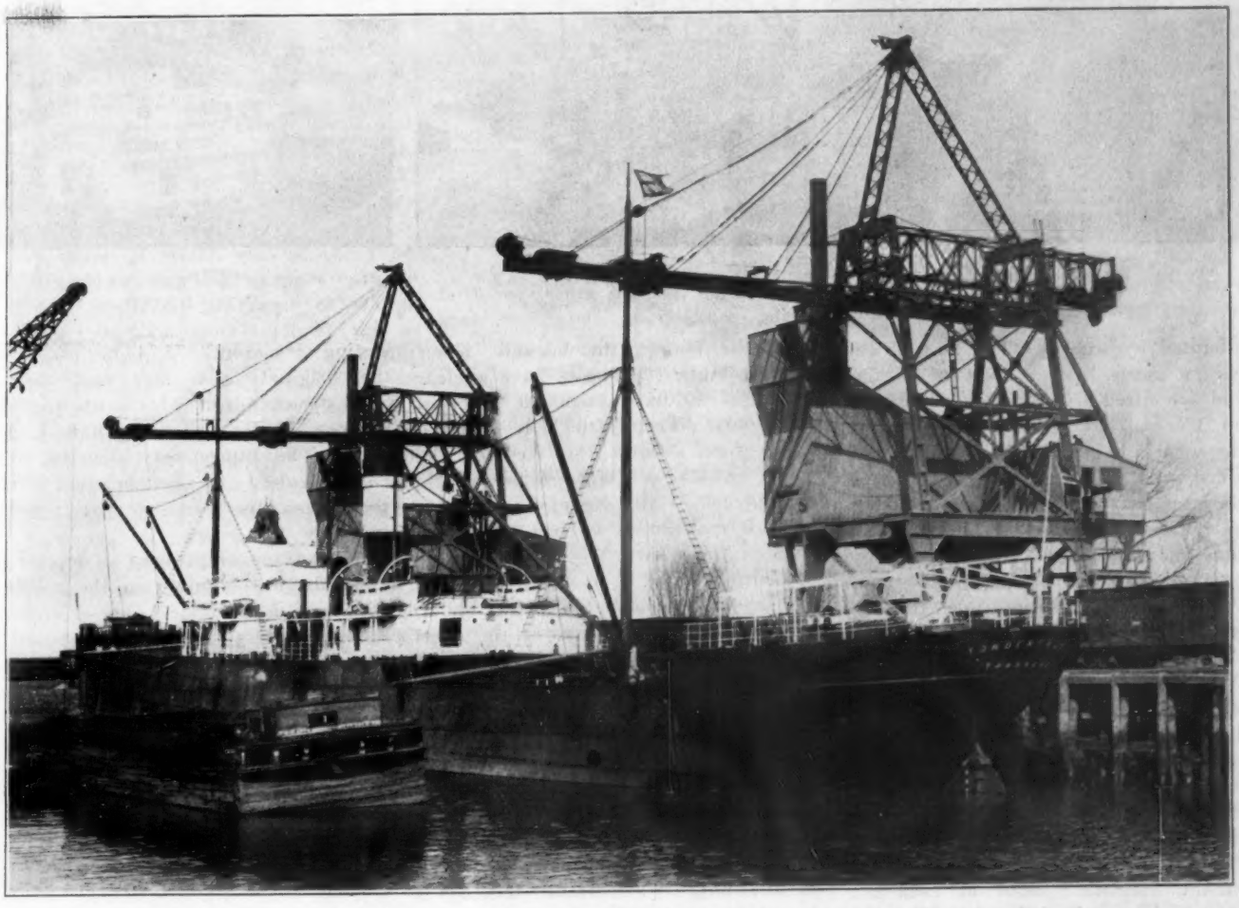


FIG. 2—UNLOADING A CARGO OF SWEDISH ORE WITH McMYLER MACHINES AT GIRARD POINT TERMINAL

boom, operated from the hoisting engine, for supplying the coal bunkers in the boiler house.

Another feature of these machines, is that the sheave mechanism is designed to admit simultaneous operation of the trolley and hoisting engines, with the result that the path of the bucket, after leaving the hold of the vessel, is a flat curve, increasing the speed. The hoisting speed of both grab bucket and scoop is 500 feet per minute. The trolley speed likewise is about 500 feet per minute. The number of trips per hour per bucket is 120, or one round trip each 30 seconds. Allowing for time lost in moving boats, cars, etc., each machine has an average capacity for unloading 200 tons per hour.

The machines are built entirely of steel and comprise gantry bases sur-

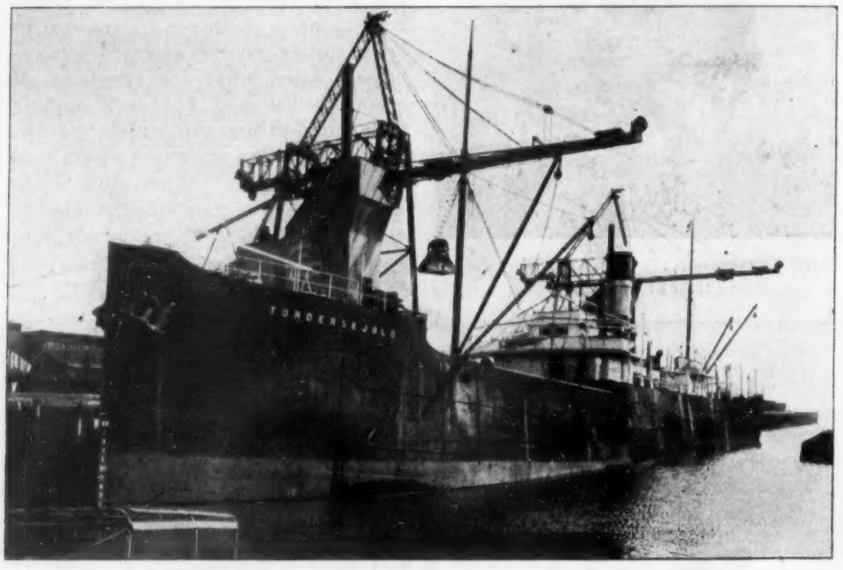


FIG. 3—ANOTHER VIEW SHOWING MACHINES AT WORK

FIG. 4—GRAB BUCKET DESCENDING INTO HATCH

mounted by towers. The legs of the gantry bases have a span of 30 feet and are fitted with wheels which rest on tracks that parallel the face of the wharf. The wheel trucks are provided with gears which are actuated, through geared shafting and clutches, by the hoisting engine. The machines thus may be spotted at any desired point on the wharf. In order to prevent wild movements, due to high winds or other causes, suitable track clamping devices are provided.

The gantry bases span two lines of standard gage railroad track on which are placed the empty hopper cars which are to be loaded. These cars, by means of switching engines and a haulage rope, operated by an independent stationary engine, are spotted under the hoppers which are located in the machinery floor of each machine. The wharf has capacity for 40 cars, and about 2,000 tons of ore can be transferred before it is necessary to replace the loaded cars with fresh empties.

The tracks along which the trolleys, carrying the buckets in each machine run, are 49 feet above the level of the wharf. Each track for approximately one-third its length is built in the tower proper. The remainder is embodied in a boom which is hinged to the tower and which, through ropes, can be swung up in a vertical position, permitting free movement of vessels along the face of the wharf.

The power for the swinging motion of the boom in each machine is derived from the hoisting engine by means of a winding drum which is engaged by a clutch. The booms are hooked in the vertical position when the machines are idle. In their travel along the booms, the buckets, when in their highest position, have a clear height of 40 feet above the level of the wharf. They also have a reach of 45 feet beyond the face of the wharf, which is ample to command the hatches of any vessel. The tower of each machine is 96 feet above the level of the wharf.

Each machine is operated by three men, one of whom tends the boiler, a second the engines, while the third controls the movements of the bucket through levers. This operator is stationed in a cab from which a clear view of all the unloading operations is obtained.

Common soapsuds, thickly applied to fresh burns, will keep out the air and draw out the inflammation as well as anything. This simple remedy is readily available in any shop.

Tests of Cuyuna Ores

The School of Mines, University of Minnesota, Minneapolis, has issued an interesting and comprehensive bulletin covering the results of concentration tests on iron ores from the Cuyuna range. The pamphlet covers the geology of Cuyuna range ores and also gives a great deal of information in regard to concentration tests on ores too low in iron to be smelted directly. A chapter on manganiferous iron ores is included, which is of unusual interest at this time. Some of the conclusions reached as the result of these tests are as follows:

"The average grade of samples from the Cuyuna range which were tested showed 45.03 per cent iron. The average concentrates produced from these samples by log washing and jigging represents 75.24 per cent of the original crude ore and carries 51.65 per cent iron. This is an increase in iron content of less than 7 per cent. The future may develop ores better suited to beneficiation than those examined up to the present time.

"The grade of product is dependent upon the iron content of the original bands of iron oxide. These contain more or less intimately associated silica which cannot be eliminated by low washing and jigging. The amount of such silica depends on the extent of the natural leaching. Computations indicate that beneficiation may be done at a profit only when the cost of mining, royalty and treatment are low, and the recovery and grade of product high. The cost of underground mining on the Cuyuna range will undoubtedly prohibit beneficiation of underground ore."

History of the Large Gas Engine

An Account of Progress in Europe, With Special Reference to Blast Furnace Gas Engines—Waste Heat Boilers Utilized

BY H. HUBERT

THE history of the birth and development of internal combustion engines is of the greatest interest, both for the engineer—to whom it shows the errors to be avoided, and indicates the right way in which new progress may be realized—and the thinker, who may find in this history one of the most striking examples of the reciprocal and fertile action of theory and practice.

Permit me to indicate rapidly some special points of this history, in order to bring to view the part that each industrial country in Europe, and more recently America, has taken in the creation of the modern gas engine, and also in the removal of the difficulties which have been encountered during the various stages of the process.

The invention of illuminating gas, and the knowledge of the explosive mixture that it forms with air, would naturally give rise to the idea of using the power of its explosion in the cylinder of an engine. The famous engineer who is considered in France as one of the inventors of illuminating gas, Philippe Lebon d' Hambuisin, also in 1799 took out a patent for an explosion gas engine. After him, several other inventors, both English and French, tried to subdue that explosive power, the exact cause of which was at the time not well known. But it was reserved for an engineer, the name of whom I am proud to quote since he was a Belgian, Lenoir, to invent in 1860 the first gas engine, which was worked industrially and commercially, and which found numerous applications in the small industries.

It was not yet contemplated, or even possible, to produce great power by means of this new engine, the biggest of Lenoir's machines not generating more than three horsepower. They worked like a double-acting steam engine, since an explosion took place during every stroke of the piston.

Lenoir's invention had given rise to the most brilliant prospects for the future, but unhappily the hopes thus awakened were not fulfilled. The only fuel with which this engine could be supplied was illuminating gas, which was very expensive and could only be obtained in large cities. The new engine not only used much more of that fuel than was expected, but, in addition, very much more water to cool the cylinder and oil for lubrication. Its effective thermal efficiency did not exceed 4 per cent of the energy which the gas could produce in the form of heat. It was less efficient than the steam engine, which, invented three quarters of a century earlier, and brought nearly to perfection by the genius of the famous engineer, James Watt, had already made very substantial progress.

A Useful Engine

If I have dwelt so long upon this first practical application of the internal combustion engine, it is because, in spite of its defects, this type has persisted so long and has rendered considerable service to the smaller industries of many towns. There were thus certain special advantages in the early form of gas engine which were going to force inventors to improve its efficiency. In 1865 there were about 400 of Lenoir's engines employed for very numerous purposes, such as printing, pumping water, driving lathes, cutting chaff, sawing stone, polishing marble, etc.

Improvements succeeded each other, both in France and in England, until another engine, of quite a different type, applying a new principle which was to greatly increase the efficiency of gas engines, definitely established the industrial reign of this type of motor. I refer to the process of explosion with previous compression of the mixture, the superiority of which method a French engineer, whose work unhappily remained unknown for a long time, Beau de Rochas, had theoretically established so far back as the year 1862. This engineer very clearly enunciated the laws to be observed in the design of the gas engine, and described very accurately the four stroke system.

But his ideas were not understood, and it was not until 14 years later that this system was adopted in the construction of a gas engine by the famous German engineer, Dr. Otto. His engine, which was simple acting and four cycle, showed such a superiority from the very beginning that it was adopted everywhere, and served as a model to many later inventors. The cycle of this engine includes four operations, each of them taking one stroke of the piston: (1) Introduction of gas and air; (2) compression of this explosive mixture; (3) igniting at a practically constant volume, and expansion; (4) exhaust of burnt gases. Only one cylinder is required, and the higher the compression, the greater is the efficiency. As a matter of fact, if we consider the gas engine as a motor, in the cylinder of which the air introduced is heated by combustion, and if we neglect the imperfections inherent to every heat engine, especially the heat loss through the walls of the cylinder, it may be demonstrated that the thermal efficiency, that is to say, the ratio between the work done and the available heat, could reach 70 per cent if the pressure at the end of the compression stroke could be brought up to 294 pounds per square inch, and the efficiency would rise to 85 per cent at 14,700 pounds per square inch. It is obviously impossible to produce such high compressions, because, on account of the rapid overheating they would give, they would ignite the mixture before the end of the compression stroke, and thus produce excessive pressure and dangerous shocks on the engine.

The compression range, which in the first Otto engines did not exceed 45 pounds, has, however, been progressively increased to 118 pounds for illuminating gas, to 147 pounds for producer gas, to 191—and even to 208 pounds—for blast furnace gas. This last is the poorest of all gases that are employed, and contains, in fact, a very small proportion of hydrogen, the most inflammable of the components of industrial gaseous fuels.

The four-cycle engine, of which we have just outlined the principal features, possesses, besides many valuable qualities of simplicity and efficiency, some serious disadvantages. In four strokes of the piston, corresponding to two revolutions, it gives only one efficient impulse to the piston. During the compression stroke resisting work is developed which is relatively considerable and which lowers the speed. During the two other strokes the pressures on the two sides of the piston are nearly equal. However the

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A lecture delivered at the forty-ninth session of the Staffordshire Iron and Steel Institute, England, March 11, 1915, and repeated at the recent meeting of the British Iron and Steel Institute. The author, H. Hubert, is professor, Ecole des Mines, Liege, Belgium.

throttling of air and gas at the inlet, and the resistance at the outlet of burnt gases are marked equally by negative work which, though not very important, is not to be neglected, as it may consume 3 to 5 per cent of the total energy developed.

We may deduce from these considerations that:

1.—The work developed during two revolutions is much less than in an ordinary steam engine where, in the same number of revolutions the piston receives four moving impulses. From this we may conclude the necessity of increasing the dimensions of the engine in order to obtain an equal power, and also for the engine to run much more quickly, in order to obtain a sufficient number of impulses per minute.

2.—The considerable variation of the moving force, which during one complete cycle, passes from a very high positive value to an important negative one, induces some very important alterations of the speed of the shaft, and in order to obtain a satisfying regularity, necessitates the use of a very heavy fly wheel. The fly wheel of the big blast furnace engine, of 600 horsepower, which Messrs. Cockerill exhibited in Paris in the year 1900, weighed 33 tons.

3.—A serious difficulty in starting the engine, which forced the makers to cut off the compression at the beginning in order not to have too much resistance to overcome.

The two first defects are evidently diminished when, as in Lenoir's engine, the engine is double acting. For a long while, however, the four cycle engines, even the largest, were simple acting. The reason of this design is that as the cylinder remained open on the shaft side, fresh air is introduced at each in-stroke of the piston, and thus cools the internal wall, which helps the action of the water jacket and favors the lubrication. Besides, the piston is in permanent contact on one side with the atmosphere, and is maintained sufficiently cold without its being cooled by an inward flow of water.

Finally, the use of the stuffing box, which presents special difficulties in the gas engine, is obviated, and it is possible to directly couple the connecting rod to the piston, by which means the length of the space taken by the engine is sensibly reduced.

A French engineer, Lelombe, who is well known on account of his work on gas engines, exhibited in Brussels in 1897 a four cycle double acting 12-horsepower engine, which was very much observed. But this example was not followed, and for a long time, in order to obtain greater power and regularity, it was usual to couple two, or even four, simple acting cylinders. These were either twin or opposite, or disposed tandem, and the ignition was arranged in such a manner that the explosions followed each other in the different cylinders. The tandem and twin dispositions allow of an impulse at each revolution, while the vis-a-vis arrangement gives two ignitions in the same revolution, which, while prejudicial to regularity, dispenses with a stuffing-box, and requires but one crank.

At the Exhibition of Paris in 1889, there were two four cycle simple acting engines of 100 horsepower: one, belonging to the firm of Otto of Deutz, had four cylinders, so that the maximum power developed per cylinder was only 25 horsepower. This power was at this time, considered as a very high one for a gas engine. However, in the same exhibition, a French engineer, Delamare Debouteville, whose attention had been directed to the gas engine by the work he had done in connection with land-traction and motor-cars, exhibited a bolder four cycle engine, which developed the same power, but with one cylinder, and which was driven by a gas producer built by the firm La Buire-Lencauchez.

This complete installation, which all engineers at that time regarded as a mistake, and as only fit for exhibition purposes, deserves a special and worthy place in the history of the gas engine. It marks the starting point of a new era, that of large power engines supplied with a gas other than town gas, and consequently free from the necessity of being erected near to a gas works.

The Invention of the Gas Producer

We are thus brought to speak of the improvement which has been the very foundation of the multiplication of the new engine. I refer to the invention of the gas producer, and of its application for the purposes of the prime mover. We are indebted to an English engineer, Emerson Dowson, for the enfranchisement of the gas engine, and for the extension of its applications. In 1878 Dowson invented his pressure-producer, which was exhibited at the York meeting of the British Association, and applied to drive a gas engine of 3 horsepower. At that time the 20-horsepower gas engine was an exception.

As we have said, Dowson's gas producer opened a new era. It has received numerous and important improvements from its author and others, and has been built with ever increasing dimensions, which permit of the supply, with one apparatus, of the gas necessary to produce 500 horsepower. Later came the suction gas producer which, proposed at first by a Spaniard, Arbos, was introduced in practice by the Frenchman, Benier, in 1894. This latter producer constitutes, with the gas motor, an installation comparable with that formed by the boiler and the steam engine, and has been of great and far-reaching importance in connection with many industries.

It may here be observed that the first forms in which man succeeded in applying the natural agents, other than the strength of animals or of the man himself, to the production of mechanical energy, were the water wheel and the windmill. But before the progress of electricity, toward the end of the nineteenth century, permitted the transport of energy to long distances without important loss, these two primitive modes of producing work obliged industries to settle where they found a waterfall, or sufficiently frequent winds, and not at the spot where energy was required. It was not until the beginning of the second half of the nineteenth century that they were able, by the invention by Hirn, of the teledynamic cable, to transport the energy to a distance of some hundred yards, which was then regarded as a very real progress.

The steam engine, on the contrary, permits of the production of energy in every place provided, however, that fuel of any kind, such as wood, turf, lignite, coal, etc., can be brought to the spot. Dowson's invention has had the same importance for the internal combustion engine. Its own development has permitted that of the gas engine by allowing engines to be placed at any place where the gasified fuel may be obtained. At the present time a large number of fuels are susceptible of being practically gasified. One of the most striking and interesting examples of the resources which the gas producer places at our disposal is the large installation for the production of power gas by the Mond producer with ammonia recovery, which has been erected in Staffordshire, and is able to distribute within an area of 25 square miles a quantity of energy which, according to Herbert Humphrey, today exceeds 20,000 horsepower.

It was not, however, without some difficulty that the gas producer overcame the hindrances which stood in the way of arriving at the present large capacity. But little time has elapsed since these difficulties were overcome. We may even say that it has not yet surmounted all of them, since the bituminous and coking coals, which are very abundant in the majority of coal measures, have not yet been practically utilized, and the necessity of using special coals is still an obstacle to the introduction of gas producers and gas engines in

some industrial regions, and to their competition with steam engines for such special applications as locomotion by land and sea.

The progress of the gas producer was not sufficiently rapid, and this would have retarded that of the gas engine in the direction of the production of large horsepowers. Happily the ironworks and the coal mines —precisely the industries which, navigation excepted, required the most powerful engines—also possessed apparatus, including gas producers, as large in size as they were excellent in their working, namely coke ovens, and blast furnaces. The latter supply enormous quantities of a gas which has a heating power much less than that of producer gas, but which contains no tarry condensable matter and needs only to be cleaned from the dust which it carries, and to be cooled, in order to get rid of water vapor and to acquire a sufficient density. Now it is just this tarry matter which constitutes a serious impediment in the use of producer gas, and has prevented the use of coking coal in the producers. Coke oven gas formerly presented the same inconvenience, but the introduction of by-product ovens allowed us to obtain a gas which is directly utilizable, provided some special precautions are taken to prevent pre-ignition, due to hydrogen, in the gas engine. For various reasons, also, by-product coke ovens have led to a reduction in the cost price of a ton of coke.

It is well known that the gas from blast furnaces is partially utilized for heating the blast in the Cowper & Whitwell stoves, and further to produce the steam which feeds the engines serving the blast furnace, such as the blowing engines, the skip hoist engines, etc.

Thus was utilized an important part of the energy which was lost by the ancient ironmasters who allowed the gases to burn at the furnace mouth. But the power thus produced was low, because the boilers themselves had a low efficiency due in part to the bad quality of the gases, which were not cleaned; there existed also the low efficiency of the steam engines which were employed.

On the other hand, improvement in the management of blast furnaces had as an effect, the reduction of the proportion of CO in the gases; that is to say, the diminishing of their heating value. This was to the benefit of the furnace itself, lowering the coke consumption per ton of iron, and consequently of the total weight of combustion gas. For these reasons the gases were on the point of being no more than sufficient for the different services which they ought to feed. The moment was therefore propitious for the last step which was to be taken, namely, to set aside the boilers and the steam engines, and to use the gases directly in internal combustion engines. This progress seems today so natural that we should be tempted to wonder why it was not done sooner, particularly when we consider that some engineers, such as Lencauchez, had already advocated the idea a long time ago, but without practical results.

It is to be observed that in industry, as in many other domains, a right idea cannot be spread nor be developed except in a favorable medium. In order that the direct utilization of the enormous quantity of heat which the blast furnace gases contain in the form of potential energy should be realized, it was indispensable that the design of large gas engines should itself have made sufficient advance. As soon as this advance began to proceed, we see the idea of direct utilization of gas resumed, first in England, and a short time later independently in Belgium and in Germany. The first attempts were made in 1894 by the late B. H. Thwaite, at the Glasgow Iron Works.

In Belgium, the Cockerill company of Seraing, near Liege, took out a patent in 1895 for this application. But the real attempts only began, both in this country and in Germany, in 1896. The first trials, which I had the opportunity of making with Mr. Bailly, one of the engineers of the Cockerill company, enabled me to announce in a paper which was printed in the Annales des Mines de Belgique, and translated in several foreign reviews, the future which could be predicted as a result of the calculation of the quantity of heat contained in blast furnace gases, and of the experiments with the trial engine. At this early period I demonstrated that the direct utilization of these gases in gas engines placed at the disposal of metallurgical industry a *supplementary* power of 20 horsepower per ton of pig iron produced per day by blast furnaces. I remember that Edward Martin, the president of the Institution of Mechanical Engineers, when speaking about this new application, characterized it in a humorous manner, by suggesting that in the future pig iron would be only a by-product of the blast furnace, the principal function of which would be to distribute light and power in the neighborhood.

The Cockerill company secured the co-operation of Delamare Debouteville who, as we have already remarked, had been working since 1889 in the direction of the enlargement of gas engines, and had been so bold as to build single cylinder simple acting four-stroke engines developing 250 brake horsepower. It was in accordance with his advice that the Cockerill company in 1897 built the first engine of this type. The piston diameter was 31½ inches and the stroke 39¼ inches.

In the trials that Professor Witz and myself conducted, this engine, when running at 120 revolutions per minute, developed 281 net horsepower, with a consumption of 13,000 B. T. U. per brake horsepower per hour; that is to say, a total thermal efficiency of 19.6 per cent. In this engine, by a phenomenon of conservatism which is very human and which has frequently manifested itself in the history of industry, as, for example, in the design of Watt's beam engine, the builders had retained all the features of less powerful engines previously used; the shaft was not cranked. The inlet and outlet valves were placed under the cylinder and its prolongation; water-jacketing was limited to the cylinder and its breech. Governing was effected by "hit and miss," and ignition by a flow of induction sparks continuously produced in the cavity of a sliding valve. The engine was started by means of a large Longuemare carburetor which supplied a very rich gas during the first revolutions. This engine, so different from those built at present, worked admirably with a gas imperfectly cleaned by simple scrubbers, and was continuously run without any alteration till 1914.

Its success was such that the Cockerill company decided upon a new and gigantic step in undertaking to build an engine of the same type but producing 600 horsepower, and

Table I.

Dimensions of New Cockerill Engines

Diameter of the pistons, inches	27.6	31.5	35.4	39.4	43.3	47.2	51.1	55.1
Length of stroke, inches	47.2	51.1	51.1	55.1	55.1	59.0	59.0	63.0
Number of revolutions per minute	115	107	107	100	100	94	94	90
B. H. P. with 2 cylinders	960	1,250	1,600	2,000	2,400	2,825	3,400	3,900
B. H. P. with 4 cylinders	2,000	2,500	3,300	4,130	5,000	5,850	7,000	8,000

to connect it directly with a blowing engine. It was, in fact, an extremely important advance, for it was necessary, for the success of the new utilization of blast furnace gas, that the benefit resulting from its use should be applied to the principal consumer of its energy, in order to render available for other purposes the largest possible part of such energy.

It will doubtless be remembered that one example of this form of gas engine was exhibited in Paris in 1900, and attracted the attention and admiration of the technical world. In the same exhibition was another engine, of nearly the same power, built by the famous firm, Otto of Deutz. But it had four cylinders, each of which developed only 125 brake horsepower. For a long time the managers of this firm maintained, in the technical reviews, that it was an error to produce more than 300 horsepower in one cylinder.

The dimensions of the Delamare-Cockerill engine of 1899 were as follows:

Diameter of piston..... 51.14 inches
Length of stroke..... 55.11 inches
Number of revolutions per minute, 95.

The trials which I had undertaken, and which were attended by a large number of Belgian and foreign engineers, were performed first by means of a very remarkable brake. At the speed of 94 revolutions the engine developed 786 indicated horsepower and 575 brake horsepower; the heat consumption was 13,760 B. T. U. per brake horsepower hour, and 10,060 B. T. U. per indicated horsepower hour, corresponding with thermal efficiencies of 18.5 and 26 per cent, with a mechanical efficiency of 71 per cent. When the blowing engine was put to work, these efficiencies increased and became 22.2 per cent, 27.1 per cent and 82 per cent respectively.

The makers had still retained in that engine the simple acting four stroke working which had succeeded up till this time. They had only altered the dimensions of the water spaces, separated the main bearings from the cylinder casing, and connected them by four strong screwed steel stay bolts, giving easy access to the piston. The shaft was cranked, and rested on three bearings. But this powerful engine had other special features. The pistons of both the gas and blowing engines were fixed on one rod. Consequently that rod had to traverse the back space in a stuffing box, the use of which gas engine makers had up till then carefully avoided. Instead of being admitted by one valve only, the gas was controlled by three separate valves placed in a valve box below the breech itself, like the exhaust valve. Two valves admitted air and gas, and a third, or mixing, valve separated the mixing chamber from the cylinder. The size of the combustion chamber had been sufficiently reduced to yield the high compression required by a very poor gas, and the two principal valves did not suffer from the explosion shock.

Further, the cooling by water circulation was, for the first time, extended not only to the exhaust valve and its seat, but to the piston and its rod. This complete cooling was of great importance on account of the special composition of the gases, which, at that time, were not cleaned and carried a large amount of dust. With the products of the decomposition of lubricating oils this dust formed solid crusts which, becoming fixed in some parts of the combustion chamber or on the piston, remained incandescent, and were thus able to ignite the gaseous mixture before the end of the compression stroke. The arrangement of the valves at the bottom of the cylinder was specially adopted to favor the scavenging of the dust and of the decomposed oils during exhaust. The composition of the iron ores used in the Cockerill company's blast furnaces was happily such that, at this time, dust caused no trouble in the first large engines. But when similar engines were erected in other works, as for example at Differdange, in Luxemburg, where the ores used were more friable, very serious difficulties were encountered which threatened for a time to stop the development of the new application of gas engines.

Important Developments in Gas Cleaning

Fortunately these difficulties were rapidly, and if not absolutely at least practically, removed by means of special cleaning and washing apparatus such as the Bian, the Tchokke, the centrifugal water injected fans, and the Theisen apparatus. The limits of this article do not permit me now to give more attention to the important question of the purification of blast furnace gases, which, however, is of great importance in connection with the efficiency and conservation of steam boilers, and of blast furnace stoves.

The results of the trials of the Cockerill engine, which we have just examined, did not show any great increase in the efficiency of the gas engine, which does not, as is the case for the steam engine, increase with the dimensions and the power. The principal thing was that it demonstrated it was possible to produce 600 horsepower, and more, in one cylinder, and consequently to construct gas engines for the great metallurgical industry able to develop 1,200 or 2,500 horsepower, if necessary, by coupling two or four cylinders. As a matter of fact, the engineers of the Cockerill company were already busy designing new types of tandem engines, for 650 and 1,200 horsepower, which were soon afterwards made.

Up till this time, 1901, the only system of governing was the "hit and miss." That system, which suits small engines, running at high speeds, required very heavy flywheels (33 tons for the engine of 1900) for the large slow speed engines. It was still possible to use it for blowing engines which do not require great regularity, but it was not suitable for driving powerful dynamos, which must run with very little variation in speed, and would have necessitated flywheels of impossible weights.

Therefore in 1901 the Cockerill company, in conjunction with Delamare, introduced a governor which opened both air and gas valves at the beginning of the suction stroke, but closed them earlier in the stroke as the power to be developed became less. It was, in fact, a *quantity* governor, maintaining the most favorable composition for complete combustion at every load. Its only disadvantage is that the compression decreases with the load, and consequently the efficiency, already diminished by the reduction of the load, becomes still less.

The trials to which we submitted the new engine in the months of November and December, 1901, showed that the average consumption was about 12,500 B. T. U. per brake horsepower per hour at full load, 15,000 B. T. U. at half load, and 28,000 B. T. U. at a quarter load. It must be remarked here that in Belgium in calculating the heat consumption and the efficiency of gas engines we have always taken the higher calorific value of the gases, whilst in Germany the calculation is made on the lower calorific value, which is, for blast furnace gas, nearly 10 per cent less, and consequently reduces the calculated heat consumption in the same proportion.

About the same time, 1901, the Otto Co. erected at the Hoerde works a large gas engine of 1,000 brake horsepower, with four simple acting four-cycle cylinders arranged vis-a-vis on two cranks. The pistons were not at first water cooled, but as they cracked, water cooled pistons were substituted. The governing system was the *"quality* governing"—effected by varying the point of opening of the gas valve,

which, though not securing good ignition at low loads, maintained the compression and gave a good theoretical efficiency.

Up to now we have only dealt with the large four-cycle engine, and have indicated its disadvantages, which are largely counterbalanced by its simplicity and its high efficiency. You will recollect that many years ago, as far back as in 1878, an English engineer, whose name I have already mentioned, Dugald Clerk, tried to remedy the principal defects of the four-cycle engine, viz., its irregular running and large dimensions, in comparison with the power developed, by designing a gas engine in which an explosion would take place at each revolution. Such an engine would evidently give a more regular turning moment and require a lighter fly wheel and altogether smaller dimensions for a given horsepower; but, on account of the short interval of time between the end of the expansion and the beginning of the compression strokes, it is necessary to supply air and gas under pressure in order to simultaneously introduce the explosive mixture at one end of the cylinder, and get rid of the exhaust burnt gases at the other end. For this purpose the engine must be supplied with one or two compressors, the work of which is lost, since pressure falls in the cylinder to one atmosphere. Besides, it is not easy to entirely prevent the entering mixture of gas and air from getting to the exhaust ports before they are completely closed and escaping with the burnt gases. Finally the compression is, generally, not so good as in four cycle engines.

For these reasons both the thermal and mechanical efficiencies of the two-cycle engine are lower, and where a comparatively expensive fuel such as coal gas or even producer gas is used, this engine cannot compete with the four cycle engine.

However, its defects are to a great extent negligible when waste gases, such as blast furnace gas, are used, and when the number of revolutions per minute is not too great. As a matter of fact, just at the time when the first attempts were made at the Cockerill works with the four cycle engine, a two cycle Oechelhauser engine was built at the Hoerde works to run on blast furnace gas, and developed 120 brake horsepower. Later, toward 1899, a twin cylinder engine of the same type was set to work at Hoerde and developed 600 horsepower. Like the four cycle engine used at this period, the Oechelhauser engine was simple acting.

The time was now ripe for an improvement which the designers of large gas engines had already considered. At the regional Exhibition of Dusseldorf the Koerting company exhibited a very remarkable two cycle double acting engine which attracted much attention. This engine developed 700 brake horsepower, and worked exactly like a steam engine, since it gave an impulse to the piston at each stroke. Notwithstanding the reluctance which makers of large gas engines had up to that time shown for the double acting engine, which was, however, Lenoir's system, and was reintroduced in 1897 by the French engineer, Lelombe, in a 12-horsepower engine exhibited at Brussels—they were compelled by the success of the Koerting engine to take up its manufacture.

In the month of December, 1902, Messrs. Cockerill, and in the beginning of 1903, the Deutz Otto Co., made double acting blast furnace four cycle engines. The Belgian engine was directly coupled to a blowing engine, and developed 1,200 brake horsepower with one cylinder, the diameter of which was 51.18 inches, the stroke of the piston being 55.12 inches.

The original design of the cylinders, with inlet and exhaust valves carried on facings underneath the breech end, did not give any trouble in the first engines, but caused some trouble with cracked breech ends in larger engines.

This difficulty was met by Messrs. Richardson, Westgarth & Co., Ltd., who had taken up the manufacture of large Cockerill engines, by the Cockerill company itself and by the Deutz works, in arranging the inlet and exhaust passages respectively at the top and at the bottom of the cylinder, the general design following that of an horizontal steam engine with external valves.

This arrangement was generally adopted by all the large engine makers on the continent, and constituted with the water cooled pistons and rods, and the hollow spindle exhaust valves, the last of the principal improvements of the large gas engine. At the time at which we have now arrived, in 1904, the principal features of the modern types of these engines were definitely fixed. Apart from the two-cycle engines, which are very different, these types did not show any very fundamental difference. They differ only in special details of construction, which may be of importance for the proper working and maintenance of the engines, but do not constitute them really special machines.

Table II.

Weights of Koerting and Oechelhauser Engines

Rated brake horsepower.	Cylinder diam. in.	Revs. per min.	Piston speed per min. ft.	Approx. net wgt. of engine. tons.	Wgt. of flywheel. tons.	Wgt. of engine per B. H. P. lbs.	Wgt. of flywheel per B. H. P. lbs.	Total wgt. per B. H. P. lbs.
Mather & Platt Koerting single double-acting power cylinder.								
400	..	110	...	35	10	196	56	252
500	..	110	...	37	13	160	58	224
600	..	100	...	59	16	220	60	280
700	..	95	....	65	20	208	64	272
1,000	..	80	...	103	32	231	71.6	303
Beardmore Oechelhauser single cylinder single acting power cylinder, two pistons.								
400	24	130	650	32	20	179	112	291
500	26	125	{ 625 / 781	42	25	188	112	300
750	30	125	781	62	38	185	113.5	298
1,000	34	125	781	80	50	179	112	291
1,500	42	94	797	180	100	269	149.3	418
2,500	48	80	800	...	...	...	.....	...

It is, of course, impossible in one article to give a detailed description of each of the numerous types which are now built, and I shall confine myself to the general principles which are applied in these engines, and the conditions which have to be fulfilled, as follows:

1.—To avoid complicated and consequently weak forms of the cylinder breech ends.

2.—To facilitate erection by adopting modern steam engine practice, in which the lift valves for admission and exhaust are placed symmetrically round the circumference, the outlet valves being fitted in the bottom to facilitate the expulsion of dust and oil residents.

3.—To make the pistons not too thick, and to cool them and also the piston rods. To support the pistons by carrying the piston rods through the cylinder covers, and carrying the rods on slippers and guides to reduce friction and wear.

4.—To so design the cylinders that

the covers may be easily taken off without interfering with other parts, and that the piston and the valves are easily accessible.

5.—To use the simplest and lightest possible valve gears, with the smallest possible number of parts.

6.—To fit each combustion chamber with two electric igniters, in order to secure complete inflammation of the mixture in the shortest possible time.

7.—To design the cylinder and the water jackets so as to allow the former to expand freely without excessive strain, and to avoid the formation of solid deposits which would interfere with proper cooling and cause breakage.

8.—The abundant and forced lubrication of all moving parts.

9.—To use "quantity" or "quality" governing, according to the work that the engine has to do, or a combination of both.

10.—To use metallic packing stuffing boxes.

Two Cycle or Four Cycle?

The question whether preference is to be given to the four-cycle or the two-cycle system is not solved when the engine is supplied with waste gas. Both systems have their convinced partisans. As a matter of fact, the total horsepower of four-cycle engines at work is greater than with two-cycle. An inquiry made in Germany in 1907 showed that 260,000 brake horsepower were produced by four-cycle engines, against 91,000 brake horsepower by two-cycle engines. These figures prove that the competition of the latter system is not to be neglected, but the importance and the connection of the builders of the four-cycle types must, said the author of this inquiry, be considered advantageous to this type.

The two-cycle seems to be less adapted for driving high speed dynamos because the very short time allowed for introducing the gas and air mixture causes too great a resistance of the charging pump, and also because the relatively larger number of explosions (especially with gases of high calorific value—such as coke oven gas) prevents sufficient cooling taking place through the walls and increases the liability to pre-ignition and fracture of the explosion chamber. These reasons, and the inferiority of the governing employed in two-cycle engines, explain why several firms which built engines on this system have, in the recent years, undertaken the manufacture of double acting four-cycle engines to drive dynamos.

The two-cycle system is more suitable for driving blowing engines, because it permits a large variation in the number of revolutions per minute, easier starting against a load, and, because of the low speed of the blowing piston, the power taken by the charging pump is only 6 to 7 per cent of that developed by the power cylinder, and is consequently not very much more than the negative work of the four-cycle engine.

However, we must point out that no two-cycle engines have been adopted for the use of blast furnace gas in Belgium. The great Cy Fabrique National d'armes de Guerre, the trade mark of which, F. N., is well known in England by the owners of motor cars, has adopted two-cycle Oechelhauser engines to produce more than 4,000 horsepower with producer gas. On the other hand, the Cockerill company now has a system of governing which permits the variation of speed of their gas blowing engines within very wide limits.

I have hitherto spoken almost exclusively about the continental large gas engines. The reason is that, though first employed in England, as we have said, these engines have not been developed to the same extent in the latter country. British makers are, however, not less competent engineers than their continental competitors. Probably English users are more conservative and do not feel so acutely the spur of necessity, because this country is richer in high value fuels, and they are able to obtain these fuels at lower prices and they have not been forced to direct their energy towards the utilization of low grade fuel and waste gases.

Nevertheless, for some years past, besides the English firms of Richardson, Westgarth & Co., Mather & Platt, W. Beardmore & Co., the Lilleshall Co., and Galloways, who have respectively taken up the manufacture of the Cockerill, Koerting, Oechelhauser, Nueremberg, and Ehrardt and Sehmer types, most English makers have also undertaken the building of comparatively large gas engines without going so far as the continental makers. We may specially quote the names of Crossley Bros., the Premier Gas Engine Co., the National Gas Engine Co., the Campbell Gas Engine Co., the Hornsby Stockport Co., Tangyes, Ltd., Fielding & Platt, and Willans & Robinson, Ltd.

I think that when the demand for large gas engines increases, English builders will be able to deliver such engines, and to provide their countrymen with the means of competing more advantageously in the world's markets with their competitors than they have done in the past, perhaps through not paying sufficient attention to the problem of economic power production.

American engineers have in recent years attained a good position in this branch of industry. The Nueremberg type is made in United States by the famous firm of Allis-Chalmers, which builds engines up to 3,000 horsepower. One of the largest installations in the world is probably that of the Indiana Steel Co., at Gary, near Chicago, which consists of 17 twin tandem, double acting, four-cycle engines, capable of developing a total of 51,000 horsepower.

The Snow Steam Pump Co., New York, which took up the building of large gas engines in 1904, has supplied tandem double acting, four-cycle units, which give as much as 5,400 brake horsepower at 90 revolutions per minute. The William Tod Co., Youngstown, O., and the Westinghouse company, Pittsburgh, have also built very large horizontal tandem double acting gas engines.

Design of American Engines

These engines follow, with some variations in detail, the continental practice. The Snow Steam Pump Co. has, however, made the greatest alteration in arranging the inlet and outlet valves on one side of the cylinder, in order to have a continuous foundation and bed, and to allow direct operation from the cam shaft without the long links required by the continental design.

Another alteration, which is met with in the latest type of Belgian engines, with the description of which I wish to end my article, consists of abandoning crank shafts with three main bearings, and the return to overhung cranks requiring only two bearings, giving greater simplicity and facility of erection with greater security, specially in localities exposed to ground sinking from coal mining.

But before coming to these more recent systems, I must refer to the attempts made by the American and British Westinghouse companies, and the National Gas Engine Co., to find another solution of the question of large power engines by keeping the cylinder dimensions more moderate and thus dispensing with water cooling, and in obtaining a high power by multiplying the number of cylinders and relatively high speeds of rotation.

In these engines each with three, four, six and even eight cylinders constituting a single unit of power is composed of tandem vertical simple acting cylinders. The National Gas Engine Co. has built engines on this system which, with six cranks and twelve cylinders, develop 1,500 horsepower. This type of engine requires, of course, comparatively inexpensive foundations and small floor space,

(*Continued on page* 1038b.)

Heating an Open Hearth With Tar

Interesting Data on Methods Recently Employed at Cockerill Works, Belgium, With Figures on Cost of Operation

BY ADOLPHE GREINER

IN THE month of May last year, when I presented a paper on the by-products of modern metallurgy and dwelt on their actual or prospective utilization, I was far from foreseeing the unhappy circumstances —such as those from which we are all suffering at the present moment— which would compel the Cockerill company to face the solution of a fresh problem of this nature. After the total stoppage of the works entailed by the foreign occupation, and once the preliminary period of disorganization had passed, it appeared to us that we had a pressing duty before us—that of helping the working-class population around us to the utmost extent of our power to earn its livelihood. For this reason I decided at once to undertake the manufacture of a portion of the orders we carried on our books, so far as circumstances would allow.

A Paper From Belgium

The accompanying paper was presented at the spring meeting of the British Iron & Steel Institute, in London. Aside from its technical value, it is unusually interesting because the author, Adolphe Greiner, in addition to being president of the Institute is a high official in the Cockerill company, operating a large steel works at Seraing, near Liege, Belgium. The paper suggests some of the difficulties confronting Belgian industries since the outbreak of the war. It also indicates that the Germans have not interfered materially with the operations of the Cockerill works.

Working Under Difficulties

The steelworks were thus compelled to contemplate the necessity of relighting an open-hearth furnace. Our reserves of gas coal had been speedily exhausted; the only battery of coke-ovens which was working was unable to furnish us with gas, of which it was itself in pressing need; the importation of British coal was impossible, and, as a matter of fact, we felt the need of freeing ourselves from the long established dependence of the works upon foreign countries as regards the supply of gas coal. There remained, as our sole resource, the tar from the coke ovens. In a former paper I quoted some figures relating to the use of tar fuel at the Gary works in the United States; that which others had succeeded in doing we likewise wished to do. Indeed, even as far back as last summer, experiments had been undertaken for heating by tar the little 12-ton furnace kept for our experiments, which had already been modified for the purpose of utilizing coke-oven gas. These earlier experiments were carried out by employing injectors of a very rough kind, which were led in, one at each end of the furnace, in the axis of the port used for delivering the coke-oven gas. An arrangement of this description allowed us, in the event of delay or stoppage, to have recourse, without loss of time, tothe older form of fuel, which always remained available. Indeed, as a matter of fact, during this experimental period, I am compelled to admit that the inconveniences arising from the use of tar were numerous, and we only succeeded in finishing a few of the charges commenced with this fuel, without being compelled to fall back on the earlier method of heating. So much was this so, that when we found ourselves brought to a standstill for want of the coal which might have been used to feed some other furnace, the problem was a long way from having been solved.

Nevertheless, the stimulus of need, added to the satisfaction that we promised ourselves at being able to do without foreign coal, decided us to employ this mode of heating, by hook or by crook. It is not my intention to describe here the details of an installation so often modified, and still less the succession of set-backs which neither rebuffed nor discouraged the engineer, Mr. Bourgy, who was in charge of the open-hearth furnace. I will confine myself to saying that not a single charge was lost. On the contrary, experience, even when unhappy, being a fruitful lesson, we arrived by successive modifications at furnishing this experimental furnace with sufficiently reliable appliances which have enabled me today to put before you a few figures resulting from practice that has become truly commercial.

Result of Ten Weeks' Work

These results relate to a campaign of ten weeks' work, from Jan. 10 to March 20, 1915, during which, apart from the intervention of Sunday, the only stoppage resulted from a delay in the deliveries of fuel, a detail which it is not always possible to control. Owing to various circumstances, the furnace was stopped at the end of ten weeks after having produced, in 215 charges, a total of 1,986 tons of steel of varying composition.

In the present arrangement the tar is delivered to the sprayers (one only in each burner) with a regular feed and under a uniform pressure of 7.3 pounds per square inch. It is sprayed by means of air compressed at about 44.3 pounds per square inch. The hot air of combustion is admitted above the injector through the existing port, inclined at an angle of 45 degrees. The average consumption of tar throughout the whole campaign has been 300 pounds per ton of steel, including in this figure the amounts required for lighting up and for heating during stoppages. On the other hand, with an uninterrupted run, this average falls to 250 pounds per ton. The average weight of the charges had to be diminished in order to avoid

Data on Tar Fuel for Open-Hearth Furnace

	Heated producer-gas + hot air.	Cold coke-oven gas + hot air.	Tar + hot air.
Tonnage produced during campaign	2,624	3,516	1,986.5
Average daily production, tons	39	48	38
Average proportion of pig iron per charge, per cent	31	21	28
Average waste, per cent	5.5	4	4.8
Fuel consumption per ton of steel, pounds	650	9,800*	250
Cost of heating per ton of steel	$1.64	$0.81	$0.89

*Cubic feet.

any deflection of the jet of flame issuing from the pulverizer towards the crown of the furnace. Nevertheless, several charges of 15 tons have been worked successfully without any other inconvenience than a proportionately longer working time. The proportion of pig iron found necessary in the charge rose to 28 per cent.

I may add that, after these 215 charges, the furnace is still in an excellent working condition. The roof appears even less damaged than after a similar campaign with coke-oven gas; only the chambers became incrusted. The bricks of the checker work became covered with a carbonaceous substance, and it will be necessary to devise some means of remedying this inconvenience.

I wish to add that, as a sequel to the satisfactory results we are obtaining, we have built a new furnace of 25 tons capacity, furnished with appliances completely modified for the purpose of the exclusive utilization of tar as a fuel.

The accompanying table affords a comparison of the different results of experiments obtained with this small 12-ton furnace when working, as originally, with producer-gas; with coke-oven gas, after a modification of the chambers and of the burners; and, finally, when using tar, and without any further modification than the addition of the several pulverizers.

Meeting of Iron and Steel Institute

The annual meeting of the British Iron and Steel Institute was held at the institution of civil engineers, London, May 13 and 14. The bessemer gold medal for 1915 was received on behalf of Pierre Martin, to whom it had been awarded by Paul Cambon, French ambassador to Great Britain. The Andrew Carnegie gold medal for 1914 was presented to E. Nusbaumer, of Paris, France. On account of the war the annual dinner was omitted. It has been provisionally decided to hold the autumn meeting of the Institute in London during the week ending Sept. 25. Among the papers which were read and discussed were the following:

Papers Read

"Diffusion of Carbon in Iron", by F. W. Adams; "Supplementary Notes on the Forms in Which Sulphides May Exist in Steel Ingots, Part II", by J. O. Arnold and G. R. Bolsover; "Researches on Iron, Silicon and Carbon Alloys", by G. Charpy and A. Cornu; "Corrosion of Iron in Aqueous Solutions of Inorganic Salts", by J. A. Newton Friend; "Communication on the Heating of an Open-Hearth Furnace by Means of Tar", by A. Greiner; "Sound Steel Ingots and Rails", by Sir R. A. Hadfield and G. K. Burgess; "The Nature of the A2 Transformation in Iron", by K. Honda; "Brinell Hardness and Tenacity Factors of a Series of Heat-Treated Special Steels", by A. McWilliam and E. J. Barnes; "Thermo-Electric Properties of Special Steels", by A. M. Portevin and E. L. Dupuy; "Stress-Strain Loops for Steel in the Cyclic State", by J. H. Smith and G. A. Wedgwood; "Detection of Burning in Steel", by J. P. Stead, and "Iron, Carbon and Phosphorus", by J. E. Stead

Book Review

Patternmaking, by Frederick W. Turner and Daniel G. Town, published by John Wiley & Sons, Inc., New York, and furnished by *The Iron Trade Review* for $1.00.

This volume is intended primarily for the younger patternmaker. It furnishes a general survey of the most suitable materials, the special tools and the fundamental processes of the trade. The relations of the pattern room and allied departments, with special reference to the foundry is discussed. Detailed construction of typical patterns has been discussed in a number of books published previously, but this last work is a creditable addition to the literature of patternmaking. The authors are instructors in patternmaking at the Mechanic Arts High School, Boston, and are skilled in their trade.

Safety in Shop and Field

ON THE opposite page are shown several accident prevention devices developed by the New Jersey Zinc Co. Figs. 1, 2 and 3 show the old and new methods of opening standard gage, general service side dump gondola cars. The use of a crowbar, as shown in Fig. 2, frequently results in serious injury as indicated in Fig. 3. When using the safety knuckle bar, Fig. 1, the workman cannot be thrown to the ground by the force released when the pawl on the end of the car is raised.

In Fig. 6 is shown a safety ladder which recently was built at the company's blast furnace plant at Palmerton, Pa. Blast furnace practice naturally is attended by considerable danger to the workmen. One of the most serious perils is that of falling from high places. To eliminate this danger the old style of open ladder at the blast furnace at Palmerton was supplanted by the one shown in the illustration. The new ladder is a vertical shaft constructed mainly of angles and bars, so arranged that a man climbing up or down inside it cannot sustain a fall of more than 10 feet. The ladder is divided vertically into 10-foot sections, each of which is surmounted by a steel landing which occupies one-half the cross section of the shaft. The landings are placed alternately at either side of the shaft, so that no matter at what level the man is inside the ladder, he has a landing within 10 feet below him. The rungs of the ladder, as a result of this construction, are arranged in alternating 10-foot sections, in two adjoining vertical courses.

The company did not have to wait long for results from this ladder. About two days after it had been completed a workman, while beginning to descend the ladder, was overcome by gas. His fall, which under the old conditions probably would have resulted fatally, was broken by one of the landings and he sustained no injuries whatever. This man has a wife and children.

Before entering the plant at Palmerton, wagons and trucks have to cross a railroad siding. In order to prevent accidents a gate was devised as shown in Fig. 7. In one position this gate obstructs the track, automatically opening the roadway. With the gate in the other position, the roadway is closed, while the train has the right of way.

Many accidents have resulted in the efforts of workmen to place belts on pulleys. Fig. 4 shows a belt placer which in addition to facilitating the operation, removes all danger to the workman. Fig. 5 shows an ordinary ladder fitted with safety sprigs. These sprigs are of steel; they have sharp points which will grip even a concrete floor. As shown in the illustration, there are two points on each sprig, thus making it immaterial which side of the ladder faces the floor. Figs. 8 and 9 show apparatus for use in unloading hopper cars. The wrench shown in Fig. 8 is of very simple construction and is made to stand rough usage. The safety belt shown in Fig. 9 has been adopted to prevent men, when unloading coal or ore cars on trestles, from being carried through the hopper with a slide and buried in the material, resulting frequently in serious injury.

FIG. 1—SAFETY KNUCKLE BAR

FIG. 2—THE UNSAFE CROWBAR

FIG. 3—RESULT OF USING CROWBAR

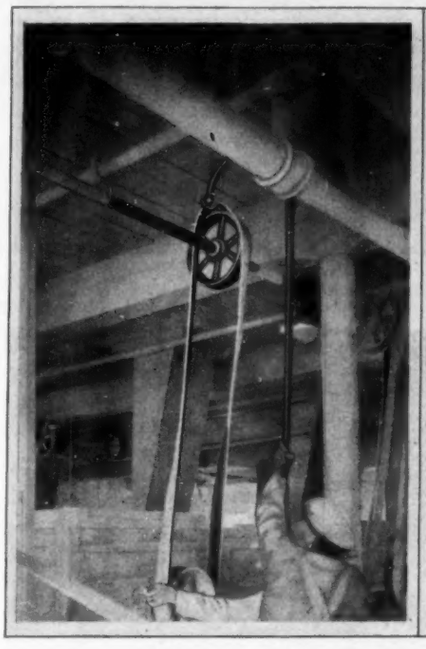

FIG. 4—SAFETY BELT PLACER

FIG. 5—SAFETY LADDER SPRIGS

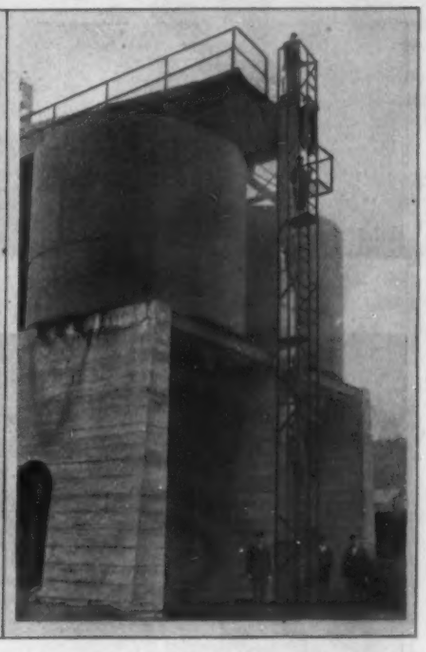

FIG. 6—SAFETY LADDER

FIG. 7—SAFETY GATE

FIG. 8—SAFETY CAR WRENCH

FIG. 9—SAFETY BELT

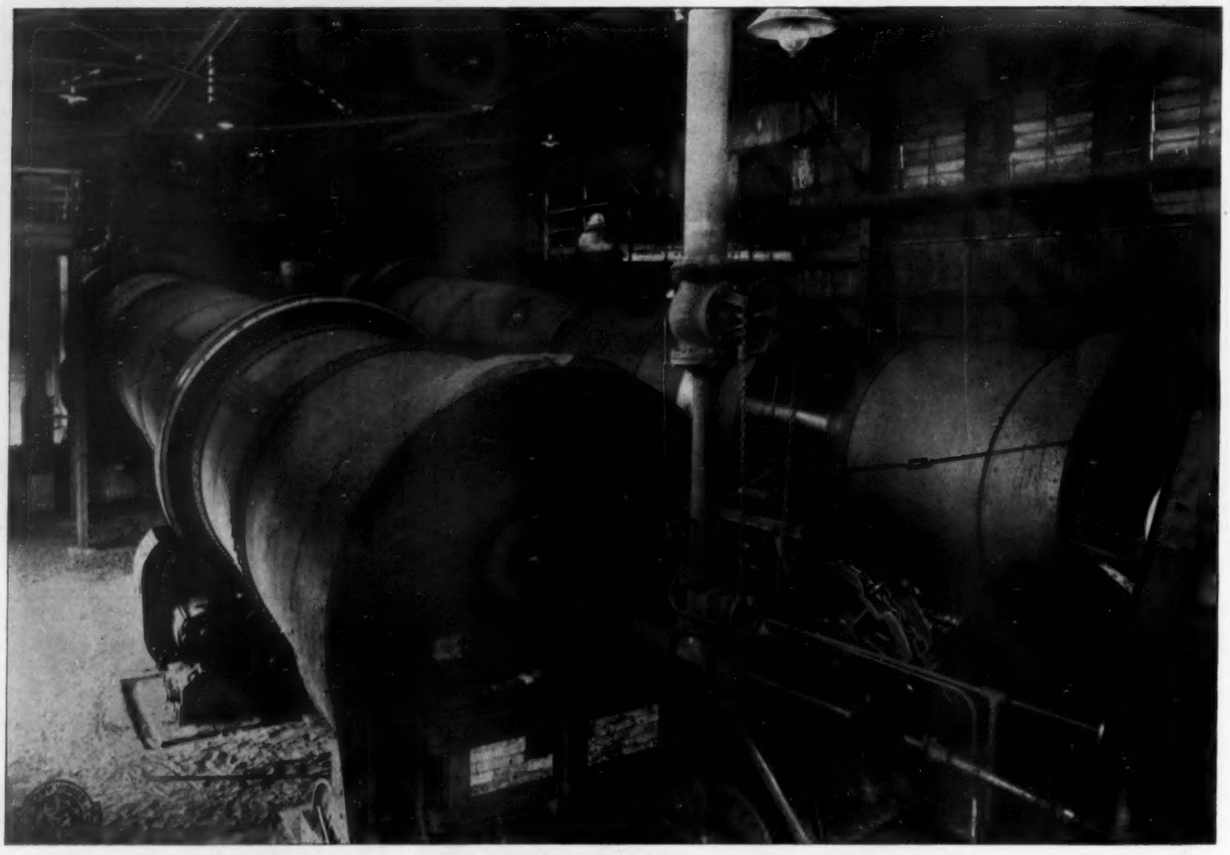

FIG. 1—INTERIOR OF GARY SINTERING PLANT SHOWING GENERAL ARRANGEMENT OF KILNS

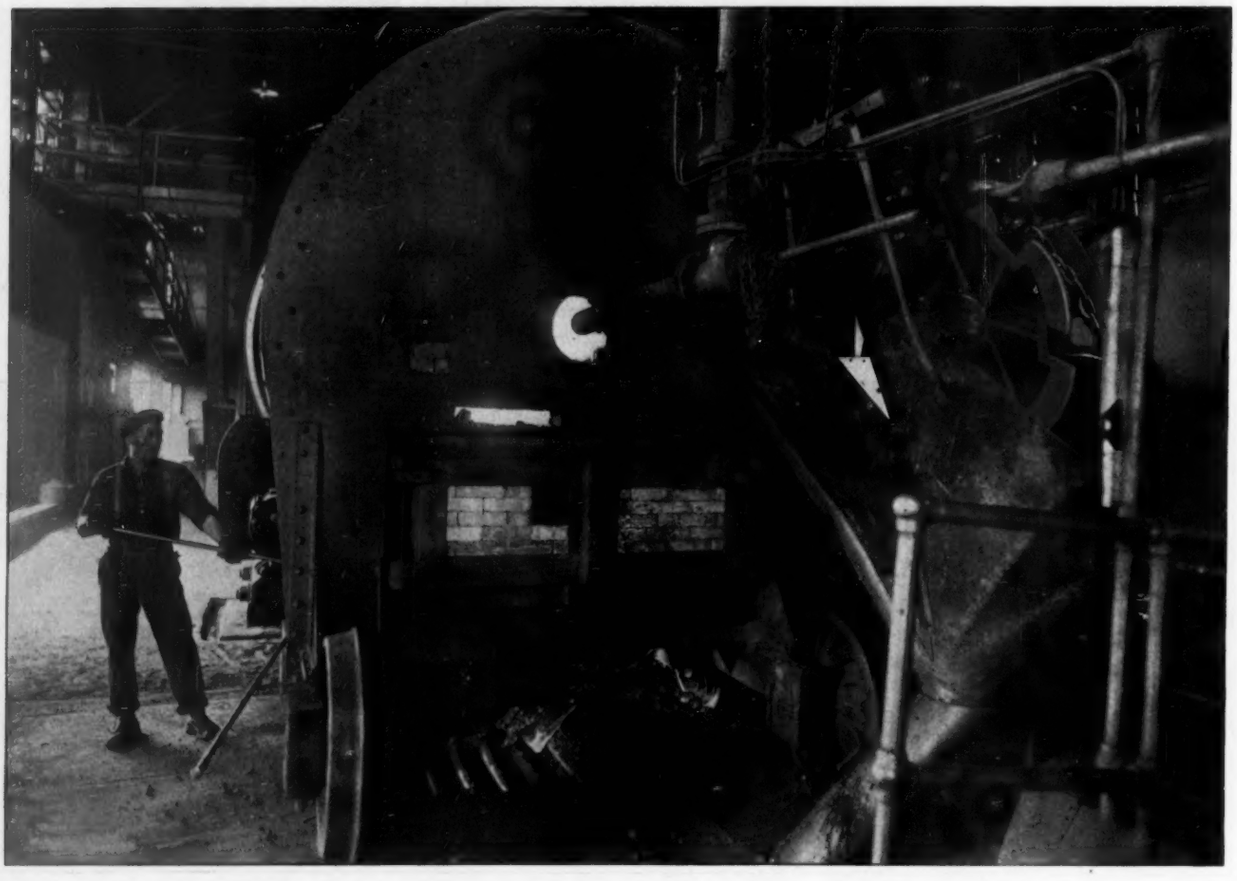

FIG. 2—DISCHARGE END OF ONE KILN SHOWING SHIELD, GAS BURNER AND SPROCKET CARRYING SCRAPER CHAIN

Rotary Sintering Kilns at Gary

Details of an Important Improvement to the Great Plant of the Indiana Steel Co. Resulting in Improved Furnace Operation

BY H. COLE ESTEP

IN RECENT years progressive blast furnace managers have been giving serious study to the problem of recovering at least a part of the fine iron bearing material usually lost in the flue dust. Although a considerable portion of the iron in the flue dust can be recovered by recharging the dust into the furnace with the ore, coke and limestone, this method has certain disadvantages which make it desirable to change the physical characteristics of the material before recharging. Sintering has proved of value in this connection, inasmuch as the percentage of iron is increased and the material is agglomerated into a satisfactory size for charging into the furnace.

To take care of the large quantity of flue dust discharged from the eight blast furnaces at Gary, the Indiana Steel Co., subsidiary of the United States Steel Corporation, has installed a sintering plant with a capacity somewhat in excess of present requirements, the plant being designed to take care of the flue dust from a total of 12 blast furnaces, similar in size to the eight now in service.

The Gary sintering plant is equipped with two rotary kilns, each 9 feet in diameter and 90 feet in length. Sintering machines have been developed in several forms, the rotary kiln being one of the earliest and simplest. It has the advantage of combining low operating cost with large capacity.

Standard Railroad Cars Used

The sintering plant is located south of the blast furnaces, near the turning basin at the head end of the slip. The flue dust is discharged from the dust catchers at the furnaces directly into standard 50-ton hopper bottom gondola cars. At the sintering plant the contents of the cars are discharged into a steel and concrete track bin. Screw conveyors transfer the dust from the track bin to the boot of a bucket elevator, from which it is discharged into a hopper at the top of the sinter house. After passing through a 1-inch mesh revolving screen, it is discharged into one of two cylindrical steel storage bins, which have a capacity of approximately 230 tons each.

The material is transferred from the storage bin into the kiln by means of a double spiral conveyor. This conveyor is motor-driven and is so arranged that the feed may be accurately controlled.

The principle features of the kiln are shown in Figs. 1 and 4. The tube, which is built of 11/16-inch plate, is 90 feet in length with a shell diameter of 9 feet. The lining is 12 inches, giving it inside diameter of 7 feet. The kiln is carried on two bearing rings located 15 feet and 21 feet, respectively, from the lower and upper ends. The kiln is rotated by an annular gear, which is fitted around the shell at a point 28½ feet from the upper end. This gear is connected to a 60-horsepower alternating current motor by means of a pinion, bevel gearing and a belt, the motor operating at 715 revolutions per minute. The kiln is operated at about one revolution per minute and the

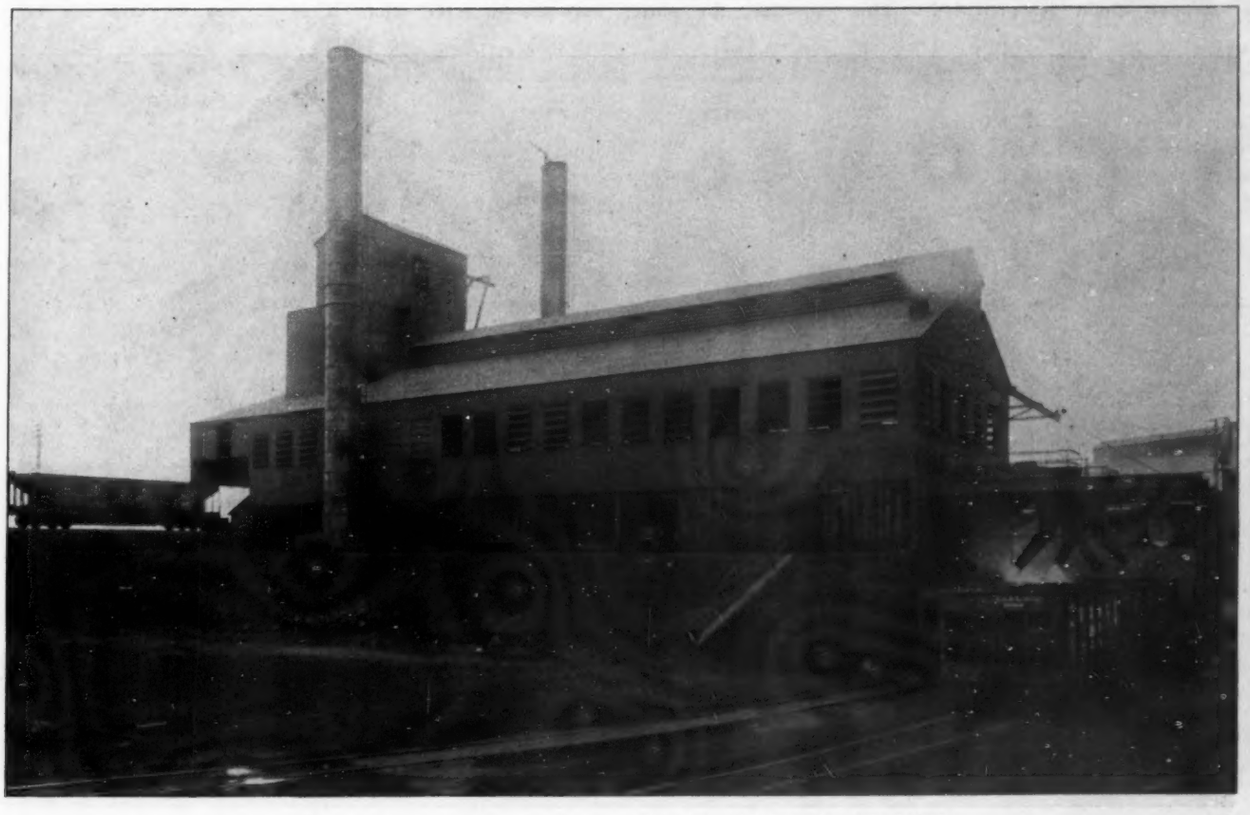

FIG. 3—SINTERING PLANT OF INDIANA STEEL CO. AT GARY

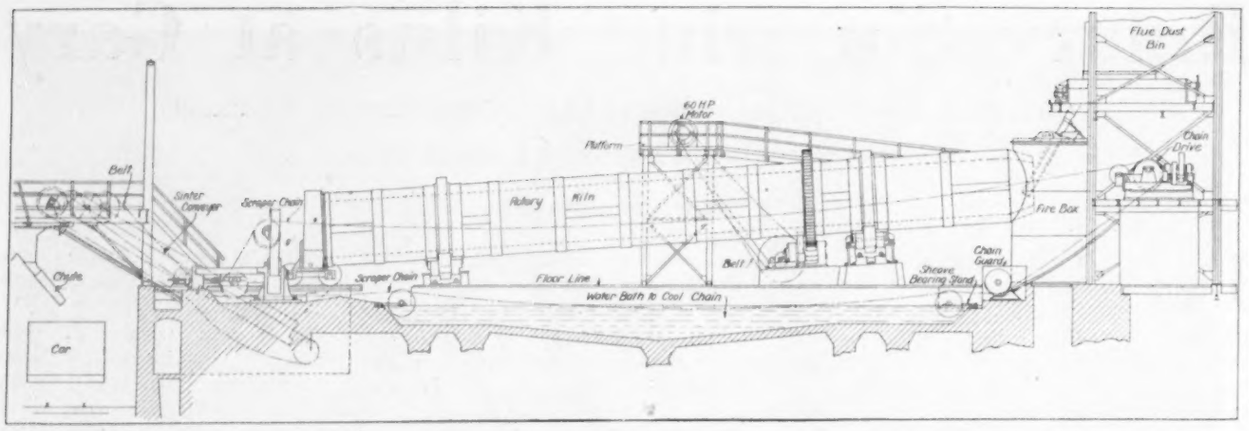

FIG. 4—ELEVATION OF KILN SHOWING OPERATING MECHANISM AND ACCESSORIES

material which enters at the upper end slowly works its way down toward the lower or discharge end. The speed, temperature and rate at which the material passes through the kiln are regulated so that a clinker of satisfactory quality and composition is obtained at the discharge end.

The lower end of the kiln is closed by a movable fire housing, shown in Fig. 2, through which the gas burner is introduced. After passing through the kiln, the gas is discharged at the upper end into a smoke box, which in turn connects with a self-sustaining steel stack. Coke oven gas is utilized.

In order to facilitate the passage of the material through the kiln and to prevent it from sticking to the walls, a scraper chain is provided. This chain passes through the kiln and over pulleys at either end. On the return side, the chain passes through a water bath underneath the kiln, in which it is cooled. The chain, which is provided with a suitable arrangement for taking up the slack, is driven by a 20-horsepower, 220-volt, direct-current motor. The chain is operated at a speed of approximately 70 feet per minute.

The hot sinter is discharged from the lower end of the kiln onto a conveyor, which transfers it to steel chutes leading to cars. The sinter conveyor is motor-driven and its construction is similar to the strand of a pig-casting machine. The discharge chutes are provided with two spouts so that the sinter may be directed into either one of two cars standing on parallel tracks beside the building. As the clinker drops into the cars it is cooled by a water spray. Ordinary hopper bottom standard gage cars are used for handling the sinter.

The structural work in connection with this plant was fabricated by the North Works of the Illinois Steel Co., Chicago. The flue dust and sinter conveyors were furnished by the Calumet Foundry Equipment Co., Harvey, Ill., and the kilns were built by Reeves Bros., Alliance, O.

When forging a tool it is better to take time to secure or make a pair of tongs that will grip the work firmly while it is being hammered, than it is to buy a glass eye later.

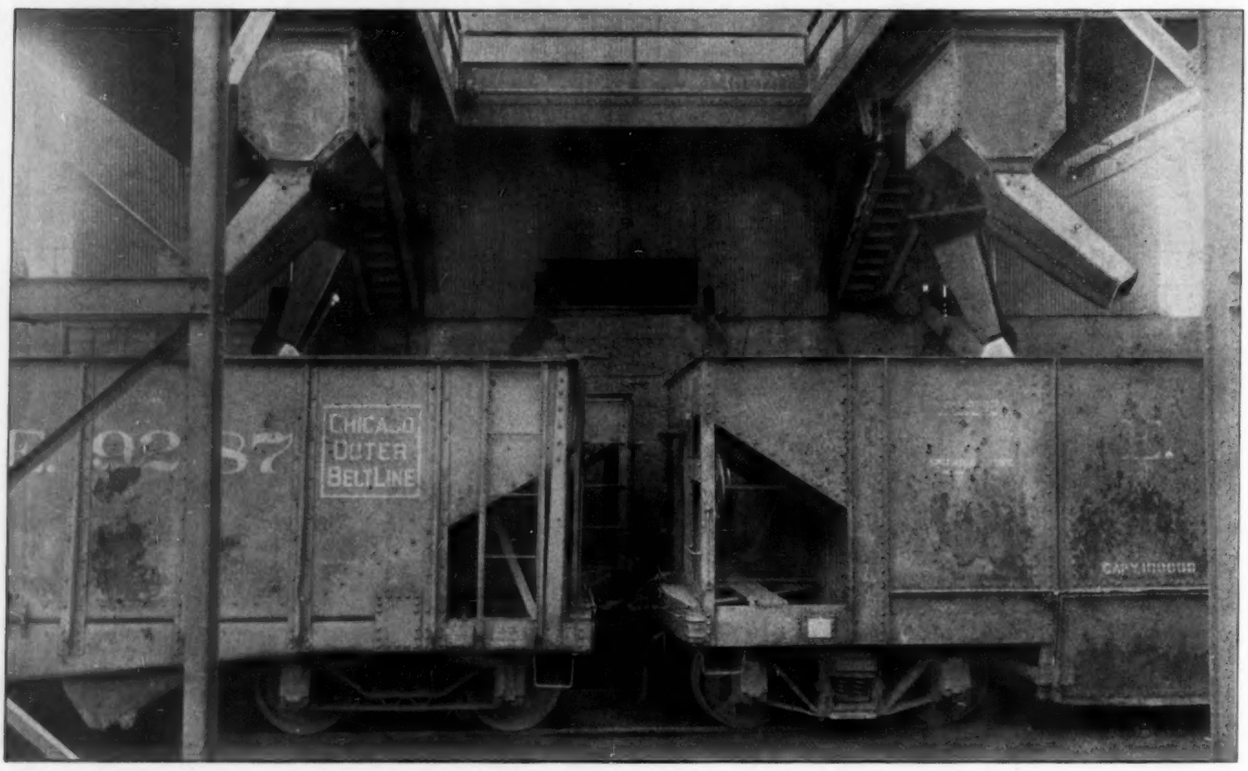

FIG. 5—DISCHARGE CONVEYORS AND LOADING CHUTES

Rust Removal by Chemical Reagents

Results of a Series of Quantitative Experiments Showing Effects of Numerous Reagents on Rusty Iron

BY J. NEWTON FRIEND AND C. W. MARSHALL

A CHEMICAL reagent that will readily remove rust from iron is desirable. In many cases, as, for example, in cleaning structural steel work prior to painting the loss of a little iron along with the rust is not a matter of serious moment. In the cleansing of museum specimens, particularly when attempts are made to read partially obliterated inscriptions, it is important to lose as little iron as possible. In scientific investigations, which have for their objects the quantitative determination of corrosion by weighing the iron before and after attack, it is essential that the loss of unoxidized metal involved in removing the rust shall be reduced to the absolute minimum.

Electrochemical methods have been suggested frequently, the rusty iron being suspended as cathode in a suitable electrolyte, the anode consisting of some inert material, such as carbon or platinum. By adjusting the current density, the hydrogen set free at the cathode appears to loosen the rust by what is asserted to be a purely mechanical process, not involving the solution of any iron, and for such processes considerable accuracy is claimed. Scraping with knives and polishing with sand-paper or emery-paper has been the process adopted for small specimens by the authors in previous researches, and the method has proved perfectly satisfactory. But for large test-pieces, such as plates measuring one or two square feet in area, the scraping process is very disagreeable and fatiguing.

Different investigators have frequently alluded to dilute solutions of sodium citrate as suitable media for loosening rust without dissolving any iron. It seemed desirable, therefore, to test this assertion by a series of quantitative experiments with rusty plates, and to extend the inquiry to the action of other chemical reagents upon rusty iron.

Method of Experiment

It is difficult to obtain a large number of small plates rusted evenly over their surfaces and to an equal quantitative extent. The metal ultimately chosen consisted of mild open hearth steel sheets, cold rolled and charcoal annealed, measuring 1 x 2 feet in area, and 22 B. W. G. in thickness. Several of these sheets were soaked in water and exposed to the air for a month, after which they appeared to be corroded fairly equally over their surfaces. They were then cut up into squares, measuring 2.25 x 2.25 inches, and weighing approximately 19 grams. In order further to insure uniformity, results obtained with the small plates were only compared with others cut from the same large sheet. The plates contained approximately 0.2 gram of hydrated ferric oxide, in which was only the merest trace of ferrous iron. Several of the plates were thoroughly cleaned with emery-paper, the mean losses in weight being taken as standards for comparison with the results obtained by chemical means. As an example of the degree of accuracy that may reasonably be expected, the following losses of weight of small plates cut from the same sheet may be quoted:

	Sheet 1. Gram	Sheet 2. Gram
Plate 1	0.2495	0.1772
Plate 2	0.2347	0.1682
Plate 3	0.2336	0.1718
Plate 4	0.2398	0.1628
Average	0.2394	0.1700

The extreme values for plates cut from sheet 1 differ from each other by 6.4 per cent, while for sheet 2 the difference is 11.3 per cent. These variations show how important it is to repeat all experiments a considerable number of times in order to be sure that no effect of importance is either caused or masked by any eccentricity of the metal.

The plates, except where otherwise stated, rested on paraffin sheets in an inclined position in beakers of 450 cubic centimeters capacity, and were exposed to diffused daylight at a temperature of approximately 15 degrees Cent. At stated intervals the plates were removed, scrubbed with a small brush under the tap, wiped and dried with filter-paper, the last traces of moisture being removed prior to weighing by gently warming near a boiler. After immersion in acid solu-

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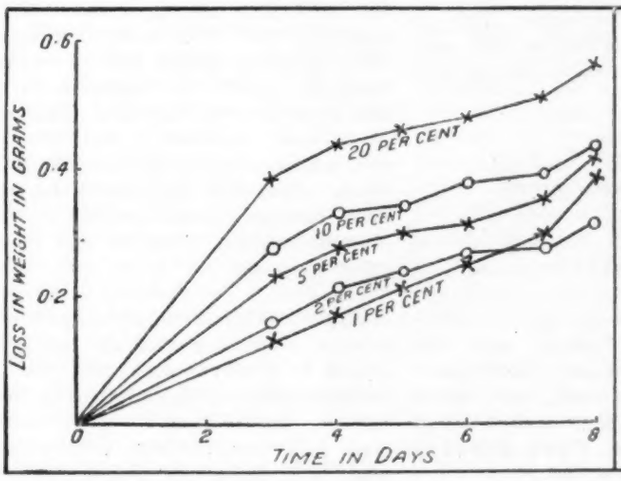


FIG. 1—REMOVAL OF RUST IN SODIUM CITRATE SOLUTION

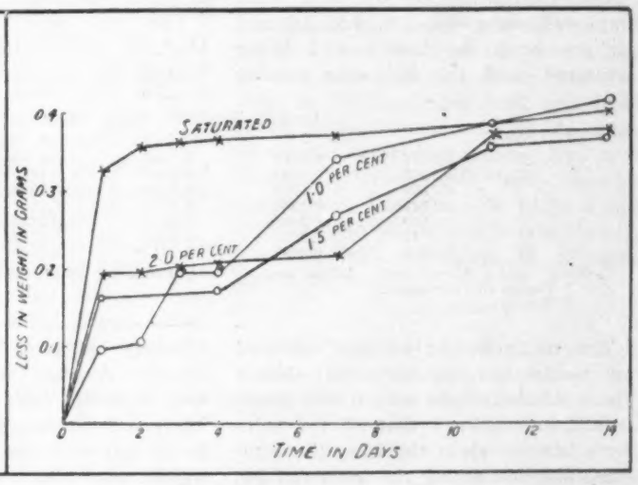


FIG. 2—REMOVAL OF RUST IN BORIC ACID SOLUTION

tions, the plates invariably tarnished during drying, if treated in this way, but that was obviated by dipping into dilute caustic potash solution for a moment or two after scrubbing, in order to neutralize any traces of acid remaining in the pores of the metal.

Five different concentrations of sodium citrate were used, namely, 1, 2, 5, 10 and 20 per cent, with the following results:

Loss in Weight of Rusty Plates, in Grams

Days	1	2	3	4	5
3	0.1248	0.1576	0.2266	0.2770	0.2810*
4	0.1746	0.2100	0.2718	0.3260	0.4326†
5	0.2110	0.2334	0.2994	0.3376	0.4574
6	0.2412	0.2534	0.3218	0.3714	0.4764
7	0.2942	0.2738	0.3474	0.3874	0.5048
8	0.3802	0.3160	0.4146	0.4258	0.5598
Sodium citrate	1 per cent	2 per cent	5 per cent	10 per cent	20 per cent

* One side clean on scrubbing.
† Both sides clean.

These results are shown graphically in Fig. 1. The mean weight of rust removed by mechanical means from similar plates of rusty iron was 0.2085 gram.

After six days, the plate immersed in the 1 per cent solution appeared to begin rusting on its own account. After eight days the first three plates were black in appearance, but turned brown on drying; plate 4 was fairly clean; and plate 5, in the 20 per cent solution, remained perfectly clean after the first four days, the metal presenting a beautiful surface. During cleaning it lost in weight practically 100 per cent more than the mechanically cleaned plates.

From these results it is evident that solutions of sodium citrate are not suitable media for investigations involving the quantitative removal of rust. Also they are extremely slow in their action, as is evident from the curves, Fig. 1. For certain purposes a 20 per cent solution might be useful, since it leaves a nice surface on the metal; but cheaper and more rapid reagents would probably be more serviceable.

The concentrations of boric acid employed were 0.5, 1.0, 1.5, 2.0 and 3.5 per cent, the last named being saturated, with the following results:

Loss in Weight of Rusty Plates, in Grams

Days	1	2	3	4	5
1	0.0472	0.0990	0.1622	0.1968	0.3260
2	0.1242	0.1044	0.1646	0.1990	0.3566
3	0.1310	0.1968	0.1696	0.2030	0.3602
4	0.1742	0.1984	0.1736	0.2100	0.3620
7	0.3060	0.3400	0.2720	0.2184	0.3690
11	0.3742	0.3857	0.3584	0.3742	0.3878*
14	0.4002	0.4131	0.3614†	0.3764	0.4054
Boric acid...	0.5 per cent	1.0 per cent	1.5 per cent	2.0 per cent	3.5 per cent

* Began to rust again.
† Nearly clean.

The mean weight of rust removed by mechanical means from similar plates of rusty iron was 0.2085 gram. It will be observed that all the solutions tend to clean the iron, the saturated solution acting the most rapidly. When once the rust has been removed the iron dissolves very slowly in the solution, so that curves, Fig. 2, become very flat. Despite the slow rate of solution of the cleaned iron, the loss involved in the removal of the rust is 75 per cent more than the mean obtained by mechanical methods, 0.2085 gram.

Various other chemical reagents were tried, but none of them proved as useful as boric acid, and it did not appear possible to find a reagent that would remove rust quantitatively without also dissolving some of the iron. A 10 per cent solution of aluminum sulphate cleansed the iron in 24 hours and yielded an excellent metallic surface.

A 1 per cent solution of chromic acid removed rust only excessively slowly, a plate of metal not becoming clean in six weeks, during which period it had lost 0.2448 gram in weight.

Saturated solutions of zinc sulphate and of magnesium chloride were also tried. In the former the rust turned black in color and signs of cleaning were apparent in the latter only after 11 days.

A 10 per cent solution of ferrous sulphate cleaned a piece of iron in two weeks, the loss in weight being 0.4588 gram compared with mechanical cleaning, 0.2394 gram.

An attempt was also made to clean some plates by immersing in a 5 per cent caustic potash solution in contact with granulated (in some cases powdered) zinc, the surface of the plates being scratched free from rust in places to insure good contact.

The rust was converted into a blackish mass containing a high percentage of ferrous oxide, but no satisfactory cleaning action was observed. A plate of pure Kahlbaum's foil, entirely free from rust, when immersed in caustic potash solution in contact with zinc, slowly gained in weight after the first day.

Since it appeared impossible to find a reagent that would remove rust quantitatively without also dissolving some of the iron, it occurred to the authors that if the plates were immersed in sulphuric acid until the rust had been loosened, the amount of iron passing into solution could be easily estimated by titration of the acid in the usual way with permanganate, and this subtracted from the total loss in weight of the plates would give the loss due to rust. It was found, however, that if the layers of rust were thick the nascent hydrogen liberated during the initial stages of solution of iron reduces some of the more closely adhering rust to the ferrous condition, with the result that the subsequent titration yields too high a value and the apparent weight of rust is too low.

Electric Furnace

John A. Crowley Co., 120 Liberty street, New York, is installing a Gronwall type electric furnace at its plant in Detroit. This is said to be the first furnace of this type to be constructed in United States, although similar furnaces have been in operation for some time in the Sheffield steel district in England. The furnace will operate on a two-phase circuit, with two electrodes. The circuit is completed through a neutral pole embedded under the lining of the hearth. This method is said to carry the current through the bath and cause a sufficient motion of the molten metal to effect uniform heating and proper distribution of any alloys which may be added to the bath.

Booklet on Bushings

An interesting booklet covering light and medium weight machine made brass and bronze castings has been issued by the Indianapolis Brass Co., 1012 East Michigan street, Indianapolis, Ind. The booklet includes data regarding special bearing bronze bushings, which are made in large quantities by this concern. Illustrations and descriptive matter also are presented covering miscellaneous brass, aluminum and aluminum-zinc alloy castings for automobiles, refrigerators, washing machines and many other purposes.

Where work is to be finished on the grinder, remember that the lathe is simply to remove stock, and not to produce a finish. If you want to save money, don't forget that the coarse feed is better for the grinder and that the lathe is simply to reduce the stock to the grinding limit.

Business News of Nation's Capital

Washington Opinions Vary as to Effect of Separating Railroads From Their Lake Lines

Washington, May 18.—Disposal by eastern railroads of their lake lines, to be made by Dec. 1, 1915, as ordered in a decision of the interstate commerce commission last Saturday, is expected to affect lake and rail transportation situation considerably. Many think it will inevitably result in an increase in rates, while others entertain the opposite view. The decision dealt with lake line application under the Panama canal act.

It applies to the ownership of the Erie & Western Transportation Co., known as the Anchor line, by the Pennsylvania and the Northern Central railroads; the ownership of the Lehigh Valley Transportation Co. (lake line only), by the Lehigh Valley railroad; the ownership of the Mutual Transit Co. by the New York Central, Erie, Lehigh Valley and Lackawanna; the ownership of the Erie railroad Lake line by the Erie; the ownership of the Canada Atlantic Transit Co. by the Grand Trunk, and the ownership of the Rutland Transit Co. by the New York Central.

The commission held that "none of the several existing specified services by water is being operated in the interest of the public or is of advantage to the convenience or commerce of the people within the meaning of the act and that an extension of the respective interests of the petitioners therein will prevent, exclude and reduce competition on the great lakes."

Prominent Delegates

Washington, May 18.—Delegates from Central and South America to the Pan-American financial conference, called at the instance of Secretary of the Treasury William G. McAdoo to meet in Washington, May 24, for the purpose of establishing stronger and close financial and trade relations between Latin America and the United States include prominent men of all the countries to be represented. Those known to the iron and steel and metal trades of the United States who have been named as delegates are:

Elbert H. Gary, chairman of board, United States Steel Corporation; James A. Farrell, president, United States Steel Corporation; C. D. Mitchell, president, Chattanooga Plow Co., Chattanooga, Tenn.; J. F. O'Neil, president, Fulton Foundry Co., St. Louis; Charles A. Coffin, president, General Electric Co., New York; Waldo H. Marshall, president, American Locomotive Co., New York; J. Louis Schaefer, vice president, W. R. Grace & Co., New York; Cyrus H. McCormick, president, International Harvester Co., Chicago; S. L. Schoonmaker, chairman board, American Locomotive Co.; Charles M. Schwab, president, Bethlehem Steel Corporation, Bethlehem, Pa.; William Heyburn, president, Belknap Hardware Mfg. Co., Louisville, Ky.; William Loeb Jr., American Smelting & Refining Co., New York; William Butterworth, president, Deere & Co., Moline, Ill.; E. M. Kerr, president Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.; Alba B. Johnson, president Baldwin Locomotive Works, Philadelphia; Frederick H. Eaton, president, American Car & Foundry Co., New York; Henry Ford, Ford Motor Co., Detroit.

Protest Against Rules

Washington, May 18.—Protest against proposed lighterage rules for New York as they would affect structural steel was voiced before the interstate commerce commission last Friday.

Charles S. Belsterling, commerce counsel for the United States Steel Corporation, appeared for the American Bridge Co., and C. R. MacCarey, traffic manager, represented Milliken Bros. Mr. MacCarey contended that in fixing the lighterage, demurrage and storage charges at New York, structural steel should be considered separately. He asserted that the loading and unloading have always been included in the freight rate and in previous instances the carriers have justified the loading and unloading of freight at New York. Mr. MacCarey stated that the roads have not justified the reasonableness of the additional charge on three to 20 tons in weight. The carriers load and unload heavy pieces at interior cities, it was asserted, free of extra charge. Furthermore, it was pointed out, the roads justify a 50-ton minimum on marble and stone and admit structural steel can be handled as economically.

Mr. Belsterling's attack was directed against the proposed advance in rates on pieces of structural steel weighing over three tons up to 20 tons, applicable to traffic moving from the west into the New York rate district. He said that the American Bridge Co. does not object to the proposed minimum charge of $20 applicable to one delivery of material by lighter, but does protest against the charge of 40 cents per ton for articles weighing over three tons and up to 20 tons in lots of 50 tons or over.

Higher Scrap Rates

Washington, May 18. — Effective May 26, increased freight rates will apply on scrap iron and steel from the Mississippi valley and certain gulf ports to St. Louis, Ohio river crossings and points beyond. The interstate commerce commission, in a decision last Friday, handed down an opinion justifying the proposed increases as well as adjustment of scrap rates from the Mississippi valley, described in broad terms, as embracing the territory east of the Mississippi and south of the Ohio rivers, and increasing the carload minimum weight from 30,000 to 40,000 pounds. The chief gulf ports from which the new rates will apply are Mobile, Ala., and New Orleans, and the principal markets affected are St. Louis, Cincinnati and Chicago.

The adjustment to be made establishes a group system and eliminates practically all fourth section departures, involving the long-and-short-haul provision, south of Memphis, Tenn. Present and proposed rates to St. Louis are considered representative, as the proposed rates to practically all the other destinations are made with relation to that city. The present proposed rates from New Orleans to St. Louis are $2.82 and $3.50, respectively. Points south of Memphis, Louisville, and Henderson, Ky., and Evansville, Ind., will take the St. Louis rate; Cincinnati 30 cents a ton and Chicago 50 cents over St. Louis; Paducah, Ky., and Cairo, Ill., 50 cents under St. Louis.

Prof. Charles M. Spofford, in charge of the civil and sanitary engineering department of the Massachusetts Institute of Technology, talked about "The Protection of Metal Structures" before the Johnstown Engineers' Society, Johnstown, Pa., last week. A number of lantern slides were shown.

Death of John Birkinbine

John Birkinbine, who occupied a distinguished position as a mining and mechanical engineer, both in the United States and in foreign countries and was noted for his knowledge and work in the field of iron ores, died at his home in Cynwyd, Pa., May 14, at the age of 71. He had been afflicted with heart trouble for some time, but his illness had not been considered critical and death came unexpectedly.

In the iron trade, one of Mr. Birkinbine's important contributions was his original advocacy and execution of the establishment of blast furnaces at the head of the Great Lakes using coke made from Pennsylvania coal. The first blast furnace at West Duluth was built under his supervision. He acted in the capacity of consulting engineer in numerous iron ore enterprises. The state of Texas commissioned him to investigate the commercial possibilities of the manufacture of iron in that state from native ores. For some years he was consulting engineer of the Philadelphia & Reading Coal & Iron Co.; worked with Thomas A. Edison in the latter's early experiments in the concentration of magnetic iron ore and was associated with concentration tests of Witherbee, Sherman & Co., Inc. Mr. Birkinbine possessed a comprehensive knowledge of the extent and character of the iron ore deposits of the United States and nearby countries. He was called as an iron ore expert in the recent trial of the government dissolution suit against the Steel Corporation. He was connected with the United States geological survey and made reports on iron ore for the eleventh and twelfth census. He was the author of the chapter on "Iron Ore and Mining Operations" in "The A, B, C of Iron and Steel", just published by the Penton Publishing Co. His son, J. L. W. Birkinbine, wrote the chapter on "Beneficiating Iron Ores".

In addition to his activities in the iron trade, Mr. Birkinbine was prominent as a hydraulic and mechanical engineer. In this respect, he followed the footsteps of his father, H. P. M. Birkinbine, who achieved fame as an hydraulic engineer and as a youth, the son received invaluable training from his talented parent. He served the Colorado Fuel & Iron Co. in the enlargement of its works and in the construction of an increased water supply system. He was identified with numerous hydraulic projects among the most notable that of utilizing power from Niagara Falls.

Mr. Birkinbine had been honored by high positions in various technical and engineering organizations. He was a former president of the American Society of Mining Engineers, the Franklin Institute, and the Pennsylvania Forestry Association. He was also a member of the American Society of Mechanical Engineers, of the American Society for Testing Materials, of the Engineers' Club of New York, and other bodies, and was an honorary member of the Canadian Mining Institute. For nine years, he was editor of the *Journal for Charcoal Iron Workers,* and at his death, of *Forest Leaves.*

Mr. Birkinbine's education was obtained in the Friends high school, at Philadelphia, the Hill school, Pottstown, Pa., and the Polytechnic College of Pennsylvania. His service in the civil war broke off his college studies in 1863 and 1864. For a time

JOHN BIRKINBINE

he was associated with P. L. Weimer under the firm name of Weimer & Birkinbine, Lebanon, Pa., which later was changed to the Weimer Machine Works.

Death of Marshall Cushing

Marshall Cushing, who had been actively identified with manufacturers' associations for many years and was a familiar figure at the conventions of these organizations, died at the Post Graduate hospital in New York City, May 12, following an operation for appendicitis. His activities as a newspaper man had made him prominent in New York, Washington and Boston. At the time of his death, Mr. Cushing was editor and publisher of *How,* a magazine for manufacturers. He graduated from Harvard University in 1883. Mr. Cushing began his newspaper career in Boston where he became successively, editorial writer on the *Boston Globe* and night editor. He then served as private secretary of Senator Lodge, and later as secretary to John Wanamaker, who was postmaster general. Mr. Cushing founded the *Washington Times* and at one time was an editor of the *New York Press.* Associating himself in later years with the work of manufacturers' associations, he acted for some time as secretary of the National Association of Manufacturers, and also was connected with the National Founders' Association. Mr. Cushing was born in Hingham, Mass., in 1860. He is survived by a wife and two step-children.

Obituaries

W. M. Johnston, of the W. M. Johnston & Co., 219 South Dearborn street, manufacturers of mining machinery, died in Chicago, May 13, aged 70 years. He had been in the machinery business in Chicago more than 25 years.

William H. Gerdes, vice president, the Hall Steam Pump Co., Pittsburgh, died last week at his home in that city. He was 66 years old. Mr. Gerdes had been identified with the Hall company since its organization, 29 years ago. Two sons, William F. and H. W. Gerdes, are connected with the Hall concern. His brother, F. W. Gerdes, is president of the company.

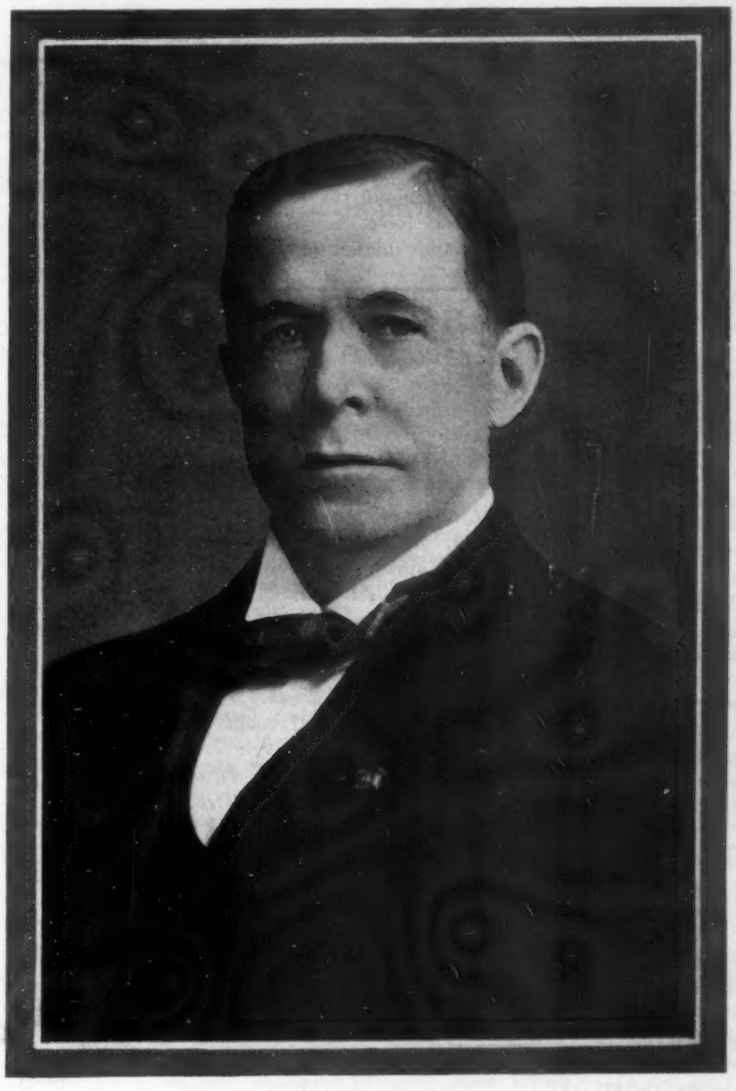
Samuel D. Nye, one of the best known of the veteran iron men of New England, died at Chestnut Hill, Mass., May 12, from apoplexy, aged 82 years. For many years, he was connected with the old Washburn Iron Works, and its successor, the Worcester Steel Works, Worcester, Mass. He later took over its car wheel foundry, moving it to Allston, Mass. He operated the foundry until its sale to the Griffin Car Wheel Co., Chelsea, Mass., in 1892.

In 1914, $1,048,503.96 in wages was lost by workers in Pennsylvania as a result of industrial accidents of various kinds, according to a bulletin recently issued by the state department of labor and industries. In all 38,126 reports of industrial accidents were filed and it is estimated by the commission that 50 per cent of the accidents reported could have been avoided. The bulletin says 64,076 persons were dependent upon the wage earners injured.

The National Gas Association is holding its annual convention, May 18, 19 and 20, at Cincinnati. About 125 people from the Pittsburgh district were in attendance.

Death of David M. Parry

Capt. David Maclean Parry, former president of the National Association of Manufacturers, died at Indianapolis, May 12, aged 63 years. He was widely known as a manufacturer, inventor, railroad builder, railroad president, promoter, lawyer, author and publicist, financier and political power. The range of his activities had touched nearly every phase of human interest. He was born on a farm near Pittsburgh, March 26, 1852. His family moved to Indiana in 1853, and he worked on the farm until he was 16 years old, when he became a clerk in a drygoods store. Later he studied at the Cincinnati School of Law and was admitted to the bar, but never practiced law. He came to New York City in the early seventies, and was a reporter on the *New York Herald* and *New York Evening Telegram*. Mr. Parry was a friend and protege of Rev. Henry Ward Beecher, by whom he was married, in 1875, to his first wife, Clara Harbottle, who died in July, 1882. After two years in New York, Mr. Parry edited for a few months a country newspaper in Montana, later returning to Indiana and starting a general hardware store. After a brief period, in which Mr. Parry established a record as a traveling salesman for his own interests, he founded a chain of similar stores. Having taken over, in 1882, a small wagon shop at Rushville, Ind., Mr. Parry removed the business to Indianapolis and developed this concern into the largest carriage factory in existence, with an output at one time of 1,000 carriages, buggies and carts per day.



DAVID MACLEAN PARRY

Capt. Parry founded and owned for some years the Overland automobile factory and business, employing John Willys, later the principal factor in the company, as superintendent. He later sold out the entire business to Mr. Willys for $250,000. Capt. Parry was also responsible for the initial financial start given Henry Ford. He built and was president of the Indianapolis Southern railroad, now part of the Illinois Central system, and with P. F. Sherman, he built and managed the Southern Dakota Central railroad. His interest in this railroad was sold about two years ago. He built and was president of the Indianapolis-Newcastle traction line, which was 54 miles long. He formerly owned the controlling interest in the Jenney Electric Light Co., Indianapolis. He was financially interested in the Motor Mfg. Co., Indianapolis, manufacturers of the Pathfinder automobile, which company is managed by his son-in-law.

He had other extensive financial interests. He was at one time vice president of the Farmers Trust Co., Indianapolis, participated in the syndicate which built the Claypool hotel, and had extensive interests not only in this country, but abroad, especially in Honduras. Capt. Parry received his title as the result of military service. He was president from 1902 to 1906 of the National Association of Manufacturers, and remained a director and life member of the executive committee. He was formerly president of the National Association of Carriage Builders, and a director of that association for a number of years. At one time he was president of the Indiana Manufacturers' Association, and of the Citizens' Industrial Association of America. For a term of year he was president of the Indianapolis Commercial Club. At the time of his death, he was president of the American Educational Society. He was, for a long time, on the board of trustees of the First Baptist church of Indianapolis. As an author, Capt. Parry was well known. His principal work, "The Scarlet Empire", an allegorical novel which satirized socialistic ideals and tendencies, had an international circulation. He was affiliated with many benevolent societies. Captain Parry also was a powerful force in politics. Though he refused ambassadorships and the vice presidency of the United States, he had a large part in the political success of many others, notably Benjamin Harrison, former Vice President Fairbanks and former Senator Albert Beveridge. He was intimately acquainted with many prominent men, including General Lew Wallace, Prince Von Bismarck, and particularly the latter's son, Herbert. He formed many notable acquaintances, during his residence in Berlin, Hamburg and other European cities, where he established branches and agencies of his carriage business.

During the greater part of 1914, Capt. Parry was abroad as a member of the foreign trade commission of the National Association of Manufacturers. While on the ship returning from this tour, he was stricken with euremia, an illness which ultimately caused his death. He was married, in 1883, to his second wife, Hessie Maxwell. His widow and nine children survive him.

War Hampers Production

English Iron and Steel Industry Crippled by Scarcity of Labor and Materials

Office of *The Iron Trade Review*,
Princes Chambers, Corporation St.,
Birmingham, England, April 30, 1915.

Pig iron prices are steady, with a reduction, however, during the week of 24 cents per ton in the Cleveland district. Today's quotations there are 65s 4d ($15.68). Trade in that district has been very seriously hit by the prohibition of exports of foundry iron to neutral countries, except under government licenses. A number of applications have been made for licenses, but only one or two have been granted. The Glasgow export trade has practically stopped, no Glasgow applications for a license having been entertained. Scottish iron masters are arranging with Cleveland makers to secure a relaxation of this stringent order. Naturally, stocks are increasing and now stand at 142,000 tons. Other makes of pig iron appear to have reached the upward limit. Northampton, Derbyshire and Lincoln pigs are quoted on last week's basis. The strongest efforts of the makers of bessemer iron have failed to further advance East coast material, and it is selling at 105s ($25.20). On the west coast, producers are in a stronger position, owing to the suitability of their iron for war material. Every ton produced is required for immediate needs and it is impossible to increase the output. The West of England makers quote 110s ($26.40) for ordinary bessemer with 124s ($28.96) for specials, both record prices. Scotch iron shares the general advance, but both makers and buyers prefer short contracts at the present high prices. Difficulties are arising through the scarcity of special alloys. No American tungsten is being received and Sheffield alloy merchants have advanced their prices of ferro-tungsten, and are asking 4s 6d ($1.08) per pound and 6s ($1.44) for tungsten powder. Production is carried on under enormous difficulties, owing to scarcity of labor, increased prices of coke and irregular supplies of other material. Regular and continuous production is practically impossible.

Finished Iron and Steel.

The market for finished materials is advancing more rapidly than for pig iron. The advances at Birmingham yesterday covered nearly every description. The most formidable rise in metals was a further increase of nearly £20 ($96) in the price of spelter, which is now quoted at £67 ($321.60), delivered, Birmingham. This is a record figure and the effect has been to stifle the galvanized sheet trade. Sheetmakers decline to offer quotations, but prices are about £16 ($76.80) per ton. For common iron, prices were up to about £10 ($48) per ton. Marked iron is only £10 10s ($50.40), and these brands must be shortly advanced.

While the demand for steel is enormous, prices have not further advanced. The explanation lies in the increasing supply of American material. British prices have become so high that in spite of freights running up to £2 5s ($10.80) per ton, it is possible to sell at a profit in this country. An example of the advances is found in wire, which now is quoted at £13 10s ($62.40) per ton, as compared with about £8 ($38.40) before the war. American steelmakers have not been specially successful in supplying wire rods.

Three large steel works in Scotland are idle, having been ordered by the government to overhaul their rolling mills for the production of heavy plates. They will be idle for about a month. Enormous quantities of plates have been produced and sold to the British and French governments. All Scotch steel is higher, and consignments of finished material deliveries at Glasgow from America were quickly appropriated. Makers of high-speed steel are enjoying a tremendous boom, and could sell a great deal more if sufficient tungsten could be obtained.

The tin plate trade is moderately active. Prices are very high and owing to scarcity of materials, makers are waiting for more favorable conditions.

The great armament firms continue to make excellent profits. The firm of Armstrong-Whitworth increased its profit from £689,000 in 1913 to £801,000 last year. It paid a 12½ per cent dividend and carried £334,000 to surplus. The Parkgate Iron & Steel Co. also paid a 12½ per cent dividend, 2½ per cent below that of 1913.

Steel Huts for Soldiers

The Birmingham, England, correspondent of The Iron Trade Review, sends the following special dispatch:

Birmingham, May 12. — A new use has been found for steel. Some wooden huts at the soldiers' encampments having been destroyed by fire, the government is considering the use of steel huts. A specimen recently submitted cost about £150 ($720) and the government inspectors were impressed with it as being fireproof, weatherproof, and sanitary. Such huts could be erected or taken down and removed from place to place easily. It is expected that they will be adopted.

Headquarters Removed

The headquarters of the Hope Engineering & Supply Co. and the Hammon Coupler Co. have been removed from the Farmers Bank building, Pittsburgh, to Mt. Vernon, O., although a sales office will be continued at the former location in Pittsburgh. The change in location of the executive offices was due to the organization last year of a subsidiary corporation, known as the Hope Forge & Machine Co., which purchased the plant of the Reeves Engineering Co., Mt. Vernon, O., and which continued the manufacture of a vertical gas engine. After several months' experience, it was decided to locate the offices of the three associated companies at Mt. Vernon, O. The foundry department of this plant has been dismantled and has been replaced by a forging plant. A large amount of machinery for making forgings for pipe couplings has been installed. The Hope Engineering & Supply Co. continues the sale of gas engines, including those of the Cooper and Reeves types. Also it is engaged in the construction of pipe lines, power plants, gas compression stations, etc. For the purpose of conducting this business in the western oil and gas fields, an office is maintained at Tulsa, Okla.

May Absorb Arms Company

The Hopkins & Allen Arms Co., Norwich, Conn., a $400,000 corporation, may be taken over by the Union Twist Drill Co., Athol, Mass., to enable the latter to take care of its large war business. The Norwich plant manufactures fire arms, employs 475 men and comprises in part, the machinery and tools of the old Forehand Arms Co., Worcester, Mass., which was removed to Norwich 13 years ago. William A. Watts is president of the Norwich company.

Money and Iron: Fact and Comment

Industrial Stocks Declined Last Week, But Not as Rapidly as in Preceding Week

WHAT would the United States do if unfortunately it should be drawn into the European war? is a question that is often asked nowadays and answered in many ways. But it seems clear that while this country would be expected to help with its army and navy, the principal assistance which would be counted upon by the allies would be to help in financing operations of the great war. This country, with its tremendous natural wealth, would be asked to shoulder heavy responsibilities in financing some of the weaker nations engaged in the conflict, as England is doing now and has done in many other wars. For this reason, and also because of the more direct relation of a possible war to some industries, it is not surprising that even after a week had passed the sinking of the Lusitania continued to have a depressing effect on the stock market. The losses sustained by industrial stocks were, however, not as large as those of the preceding week. Bethlehem Steel was an exception to the rule, scoring a decline of 10⅝ points as compared with only ⅝ of a point the preceding week, but United States Steel declined only 2⅛ points last week as compared with 7⅛ points the preceding week. Baldwin Locomotive sustained a loss of 3½ points as compared with 12¼ points the preceding week.

Stocks were sold in large volume Monday and there were many rumors of bear operations. President Wilson's Philadelphia speech Monday night had a good effect on the stock market Tuesday. Wednesday, attempts to forecast the President's position toward Germany had a reassuring effect, and later the strong approval given the President's note to Germany, and intimations of a reasonable attitude on the part of the Kaiser, strengthened the financial situation very much. Changes in the leading stocks identified with the iron and steel industry for the week ending May 15 are shown in the following table:

American Brake Shoe & Fdy. Co.	.....
Amer. Brake Shoe & Fdy. Co., prfd.	.....
American Can	— 1¼
American Can, prfd.	— 3
American Car & Foundry Co.	— 2
Amer. Car & Fdy. Co., prfd.	— 4
American Locomotive	— 3¾
American Locomotive, prfd.	— 3
American Steel Foundries	— 4⅜
Baldwin Locomotive	— 3½
Baldwin Locomotive, prfd.	.....
Bethlehem Steel	—10⅝
Bethlehem Steel, prfd.	— 1⅛
Colorado Fuel & Iron	— ⅛
Continental Can	— 2½
Continental Can, prfd.	— ½
General Electric	— 3½
International Harvester of N. J.	— 4
Inter. Harv. Corp.	— 5
Inter. Harv. Corp., prfd.	— 3½
Nat'l Enameling & Stamping Co.	— 1⅛
Nat'l Enameling & Stamp'g Co., prfd.	.....
Pressed Steel Car	— 3½
Pressed Steel Car, prfd.	— 2¾
Pullman Palace Car	+ ⅞
Republic Iron & Steel	— ¼
Republic Iron & Steel, prfd.	— 2½
U. S. Cast Iron Pipe & Fdy.	.....
U. S. Cast Iron Pipe & Fdy., prfd.	— 2
United States Steel	— 2⅛
United States Steel, prfd.	— 1
Westinghouse Mfg.	— ⅛

Railroads and Boats

Along the lakes and in financial circles in the east, there is considerable interest in the action of the interstate commerce commission in ordering the separation of railroads from their lake lines. The 62 boats affected by the order are estimated to be worth from $9,000,000 to $10,000,000 and to finance a new company or companies to take over these properties might not prove to be an easy matter. Developments as to disposing of the vessels will be watched with much interest. It is clear that package freight will have to continue to be moved in ships and it is equally clear that no new ships will be built for this service, as no one would venture to put capital into a vessel unless he knew where his business was coming from. It is not known, of course, what the railroads will do before December.

Pennsylvania Steel Report

Nothing was said or done at the annual meeting of the stockholders of the Pennsylvania Steel Co., at Camden, N. J., May 10, regarding the proposed consolidation of that company and the Cambria Steel Co., concerning which recent rumors have suggested early development. The meeting was taken up with routine matters. The following directors were re-elected for a term of three years: Edgar C. Felton, Haverford, Pa.; Francis I. Gowen, Philadelphia; Effingham B. Morris, Ardmore, Pa.; Frank C. Smith, Reading, Pa.; Edwin E. Slick, Johnstown, Pa. Mr. Slick, who is vice president and chief engineer of the Cambria Steel Co., was made a director of the Pennsylvania Steel Co. recently and now has been re-elected to a regular term.

From the standpoint of iron and steel production, 1914 was the smallest year for the Pennsylvania Steel Co. since 1899, with the single exception of 1908; from the standpoint of the value of products shipped, it was the smallest in the entire 15-year period, smaller even than in 1908, when the tonnage produced was less. The Pennsylvania Steel Co.'s report for the year ended Dec. 31, 1914, shows that this corporation, in common with other large iron and steel manufacturers, suffered marked declines in production, sales, and results for the year. After all charges, including bond interest and depreciation, a deficit of $678,491 was shown, as compared with a surplus the previous year of $629,644. The income account compares as follows:

	1914.	1913.
Operating income	$1,276,208	$2,764,141
Other income	63,842	69,520
Total earnings	$1,340,049	$2,833,662
Int. on bonded debt...	1,116,455	1,017,341
Net income	$ 223,594	$1,816,320
Depreciation, etc.	902,086	1,186,676
Deficit	$ 678,491	*629,644
Prev. surplus	5,736,507	4,732,903
P. & L. surplus.....	$5,058,016	$5,736,507

*Surplus, out of which were paid $514,020 preferred dividends in 1913, and $71,729 in adjustments.

Production in 1914.

The Pennsylvania Steel Co. and subsidiaries in 1914 produced the following, in gross tons:

	1914.	Decrease.
Coal	574,000	98,000
Coke	413,000	239,000
Iron ore	910,000	597,000
Pig iron	482,000	252,000
Steel ingots	471,000	392,000

Question of Finances

If financial aid is rendered by the government the International Mercantile Marine Co., the American line, has announced it stands ready to build four transatlantic ocean liners of large type which will fly the American flag. These vessels will be of 35,000 tons each and will have a speed of 25 knots. The company asks the United States government to render in this enterprise aid similar to that given by the English government to the Cunard line for the building of the Lusitania and the Mauretania. Officials of the company say they are not seeking a subsidy but a government loan.

Tool Trade at Top Notch of Activity

Baldwin Works Probably Books the Largest New Contract—J. S. Hopper's Inquiry for 1,000 Machine Tools Excites Interest—Crucible Steel Starts Big Additions

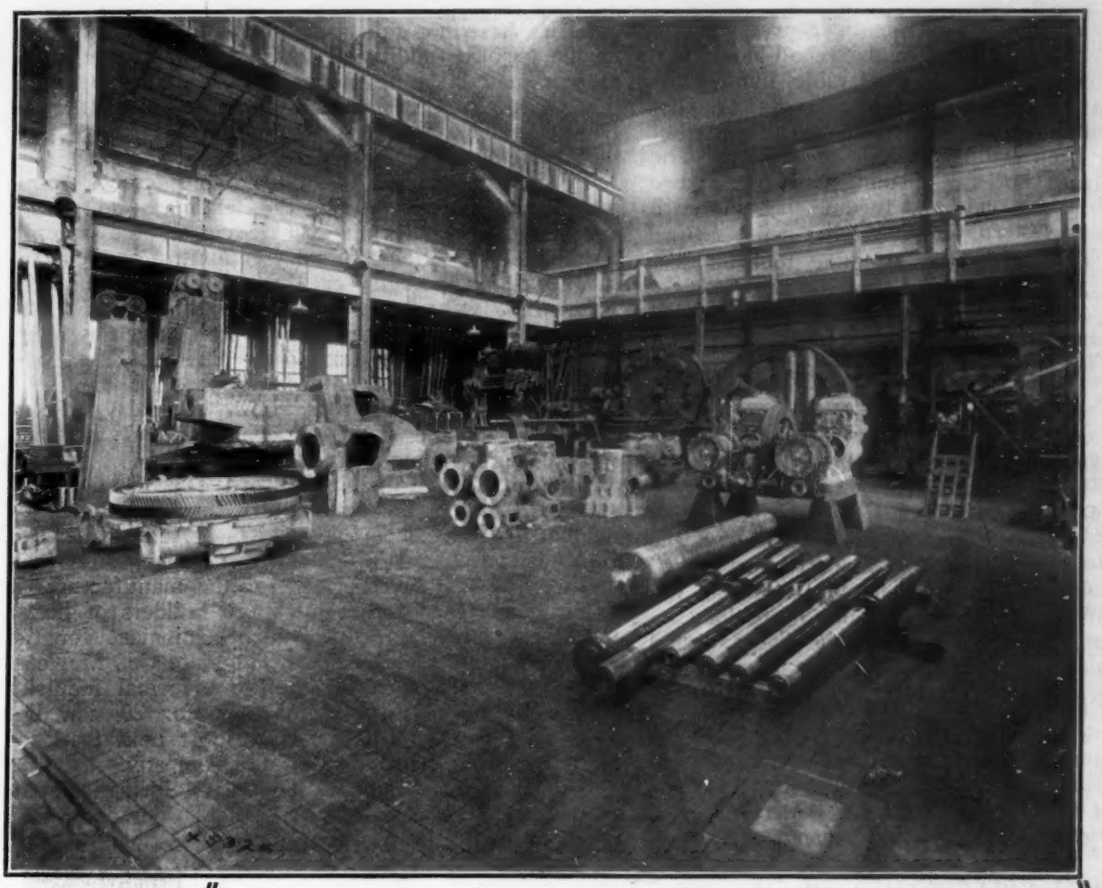
New York, May 18. (By wire.)—The Crucible Steel Co. of America, Pittsburgh, today filed plans for seven additions to its Harrison, N. J., plant to cost $381,000. The foundation work has been started.

GREAT activity again is reflected on all sides in the machine tool market and the amount of business, both under inquiry and recently placed, is fully as large, if not larger, than at any time since the outbreak of the war last year. Perhaps the leading feature of interest is the magnitude of new war contracts which either have been booked or are being figured on. The largest new contract, of which the details are not fully known, appears to be that booked by the Baldwin Locomotive Works. This company has let a contract for large additions, to involve no less than 6,000 tons of structural steel, to be built at its Eddystone, Pa., plant. It is believed the Baldwin company's contract is from the Russian government. It is known the company will manufacture shrapnel in large quantities and it also is understood that it will engage on a large scale in the manufacture of rifles. The Baldwin company made heavy purchases of machine tools during the past few days, but details of these transactions are withheld. The Westinghouse Electric & Mfg. Co. has been another exceedingly large purchaser, having closed for great numbers of milling machines, turret lathes, rifle-making machinery, etc. This company will make rifles at the plants of the J. Stevens Arm & Tool Co. and the Stevens-Duryea Co., at Chicopee Falls and East Springfield, Mass., which it has leased. The Westinghouse Machine Co. also bought heavily of lathes and other machinery for making projectiles. Among the concerns which now are figuring on shrapnel contracts are the Poole Engineering Co., Baltimore, and the Providence Engineering Co., Providence, R. I. These concerns are inquiring for large quantities of machinery. The Steel Furnishing Co., New Glasgow, N. S., is inquiring for a large amount of equipment for making shells. Clark Bros., Olean, N. Y., for the past week or ten days, have been figuring on a small shrapnel contract and have inquiries out for about 12 machine tools.

Of considerable interest is an inquiry put out by J. S. Hopper, 140 Broadway, New York, who is asking prices and delivery on about 1,000 machine tools, including milling machines, profile machines, barrel-turning machines, rifling machines, stocking machines, automatic chucking and turning machines and grinding machines. C. K. Turner & Son, 116 Broad street, New York, are asking prices and deliveries on a large quantity of projectile-making equipment. J. S. Johnston & Co., 68 Broad street, New York, are inquiring similarly for a large number of machine tools of all kinds, including equipment for making projectiles. W. E. Welborne, who just has come to this country from Russia and is staying at the Hotel McAlpin, is inquiring for a large number of lathes and milling machines. The Tropenas Converter Co., 50 Church street, New York, is in the market for projectile presses, probably four. In addition to these inquiries, a large amount of new export business has been entered. Export demand for screw machines from 1½-inch capacity up now is as large as at any time previous. There is a heavy foreign demand for the larger sizes of lathes which are being bought eagerly, due to the scarcity of the smaller sizes. A number of good orders also have been placed within the past week for knee type milling machines. Purely domestic demand continues to show improvement throughout the country and in the east and in New York, especially, machinery sellers say their business reflects greater activity and expansion in many different lines of industry. The Simms Magneto Co., Bloomfield, N. J., has purchased about 10 machine tools and continues in the market. The Eiseman Magneto Co., Brooklyn, N. Y., has bought several machine tools and still is in the market. The Grant Mfg. Co., Bridgeport, Conn., is in the market for a shaper. The Hyatt Roller Bearing Co., Harrison, N. J., has bought a few machine tools and probably will buy some other equipment. The Chevrolet Motor Co. of New York, Inc., Tarrytown, N. Y., has bought some additional property adjacent to its present buildings and probably will buy some additional machine tool equipment. Other eastern concerns which are expected to be in the market shortly are the Rowbottom Machine Co., Waterville, Conn., which is about to double the size of its present plant; the Pathe Freres Phonograph Co., which has leased the plant of the Dielectric Co., at Belleville, N. J., and will make talking machines; the Autocar Co., Ardmore, Pa., which is building additions; the W. O. Hickok Mfg. Co., Harrisburg, Pa., which is about to erect several additions; the Stafford Iron Works, Worcester, Mass., newly incorporated, which has let a contract for a new plant; the Van Norman Machine Tool Co., Springfield, Mass., which has let a contract for a new three-story addition; the L. W. Pond Machine & Foundry Co., Worcester, Mass., which is extending its present capacity, and many others. The dull spot in the machinery market is the demand from the railroads, which reflects no features of interest.

Searching the West for Tools

The sale of lathes and screw machines for shipment east to agents buying for export to Canada or Europe continues to furnish the bulk of the business done by machine tool dealers in Chicago. Although stocks seem to be practically bare of machines of this sort, dealers are continually combing the western territory and picking up single tools here and there which are available for their purposes. Occasional deliveries are also being made by machine tool manufacturers on orders placed several weeks ago and from various sources shipments are constantly being made up to fill insistent demands. One dealer recently disposed of half a dozen rebuilt lathes which had stood on his floor several years and which he had almost lost hope of selling. One merchant here is engaged in preparing 50 lathes for export, the total sale aggregating close to $25,000. Another dealer has just shipped 11 lathes whose destination is eastern Canada and another recent sale of the same dealer contained nine screw machines. An eastern buyer is in this market seeking 50 screw machines



A Permanently Level Floor

Visitors seeing this Ayer & Lord Interior Wood Block installation in the plant of the ***National Transit Company, Oil City, Pa.,*** are quick to appreciate the many advantages owners of this kind of a flooring have over owners of other floorings. They are surprised at the unexpected quiet, sanitation and neat appearance.

The National Transit Company is a very large manufacturer of pumps, engines, oil well supplies, etc., and the punishment to their floorings is very severe—the previous flooring of brick having been entirely worn out.

Write for our little booklet "Floors"

One user says:—

"The floor has given us very good satisfaction. In fact, around our plant we have never had any flooring of any kind that has stood trucking so well."

Ayer & Lord Tie Company

General Office: Railway Exchange, Chicago

CLEVELAND, OHIO, 926 Illuminating Bldg.
KANSAS CITY, MO., 1117 Rialto Bldg.
MEMPHIS, TENN., 1402 Exchange Bldg.
PHILADELPHIA, PA. 319 Perry Bldg.

and indications are he will not obtain in excess of 20. Better prices on both new and second-hand machines are prying loose a considerable number of lathes and screw machines whose owners are not using them sufficiently to make them valuable, but who have not been willing to sell previously. The time apparently is not far distant when the entire available supply of second-hand turning machines will be exhausted in western territory.

Apparently, the activity of machine tool builders in turning out lathes is causing them to neglect making a due proportion of other sorts of machinery and tools for which there is no war demand are becoming scarce. This is complicating the domestic situation somewhat and is putting other lines in much the same class as lathes. Domestic demand is somewhat spotted; some dealers report fair inquiry and sales and others complain that local buyers have retired from the market and apparently are not seeking further equipment. The Missouri, Oklahoma & Gulf railway has closed on its recent inquiry through the Arnold Co. of Chicago, and the Santa Fe has picked out a few tools on its recent inquiry, but has not placed the entire order. Nothing has been done on the recent Burlington inquiry and the list expected from the Chicago & North-Western is not out.

Pittsburgh Keeps Busy

Pittsburgh machine tool dealers notice no recession in business as a result of the complicated situation growing out of the sinking of the LUSITANIA. So far as can be learned, no orders have been cancelled and inquiries have not fallen off in volume. Dealers are unable to offer additional tools for the manufacture of war material for prompt delivery. The Standard Steel Car Co., Pittsburgh, suffered a $100,000 loss from fire at its Newcastle, Pa., plant a few days ago; the punching, shearing and bending department was badly damaged, and it is probable considerable equipment will have to be replaced, although no official announcement concerning the extent of the damage has been made. Some foundry equipment at the plant of the Union Foundry & Machine Co., South Side, Pittsburgh, was damaged by fire this week. The Aluminum Co. of America, Pittsburgh, which awarded a contract for an addition to its plant at New Kensington, Pa., to the McClintic-Marshall Co., has closed negotiations with the Lewis Foundry & Machine Co. for four stands of strip rolls and necessary equipment, including a shear to cut 13 feet of 1½-inch aluminum. The Pittsburgh board of education will spend $20,000 in the near future for small tools for manual training departments. The Aetna Chemical Co. has purchased property in Greater Pittsburgh district and will erect plants for the manufacture of explosives. One of the Pittsburgh builders of heavy machinery is engaged in making equipment for the Aetna company. McKeesport Tin Plate Co., McKeesport, Pa., is expected to send out formal inquiries for mills and necessary equipment for 20 new hot mills upon the return to McKeesport next week of E. R. Crawford, president of the company.

The Fairbanks Machine Tool Co., Springfield, O., is reported to have taken a $250,000 order for 3-inch shells from a European nation.

EASTERN STATES

NASHUA, N. H. — Tempering department of American Shearer Works was damaged by fire. Loss is reported to be slight.

BOSTON.—Pelham Realty Co. is taking bids on a 1-story, 56 x 78-foot carriage factory to be built on Pelham street, Roxbury.

BOSTON. — Sturtevant Mill Co., Clayton street, Dorchester, has let contract for 1-story and basement, 50 x 180-foot machine shop to be erected at Harrison square.

BOSTON.—Darrow-Mann Coal Co. has purchased a wharf in East Boston and will erect a coal-handling plant with 8,000 tons daily capacity.

BOSTON. — Boston-Zunner Machine Co. has been incorporated; $150,000 capital stock; by John Zunner, James H. Duffy and William P. Meehan.

BOSTON. — Boston-Stearns-Daniels Co. has been incorporated to manufacture tools; $25,000 capital stock; by Harry H. Daniels, Herman L. Stearns and Amos M. McLean.

CHATHAM, MASS.—Weld Mfg. Co. has been incorporated to manufacture machinery; $30,000 capital stock; by C. C. Weld, president; Orin W. Sadler Jr., treasurer, and O. C. Nickerson.

QUINCY, MASS.—Fore River Ship Building Corporation has let contract to Aberthaw Construction Co. for a $40,000, 2-story and basement machine shop addition.

SALEM, MASS.—Merrow Machine Co. has broken ground for a large addition to its hide and leather machinery plant.

SPRINGFIELD, MASS.—Van Norman Machine Tool Co. has awarded the contract for the erection of its proposed 3-story, 51 x 88-foot, brick building.

SPRINGFIELD, MASS. — Springfield Arms Co. has been incorporated; $100,000 capital stock; by M. A. Daniher, A. S. Laskey and Edward T. Roche.

SPRINGFIELD, MASS. — Cave Welding & Mfg. Co. has been incorporated; $50,000 capital stock; by Henry Cave, president; George H. Smead, vice president, and Edward H. Mansfield, treasurer. It succeeds the Autogenous Welding Equipment Co. and will do pressed steel work.

SPRINGFIELD, MASS. — Westinghouse Electric & Mfg. Co., according to announcement by L. A. Osborne, senior vice president, has completed negotiations for the purchase of the plant of the J. Stevens Arm & Tool Co., at Chicopee Falls, and the plants of the Stevens-Duryea Co., at Chicopee Falls and East Springfield. These plants will be used to turn out rifles to fill a large contract which the Westinghouse company booked as noted recently in *The Iron Trade Review*. The Westinghouse company has purchased a large number of small milling machines and a considerable number of turret lathes. It continues to figure on various kinds of equipment for making rifles. Walter L. Clark, formerly vice president of Niles-Bement-Pond Co., New York, and later with the purchasing department of J. P. Morgan & Co., has become identified with the Westinghouse company as reported in last week's issue of *The Iron Trade Review*. Mr. Osborne will be in executive charge of the work while Mr. Clark will be manager in charge of operations at the Stevens and Stevens-Duryea plants.

WORCESTER, MASS. — Worcester Belting Co.'s plant suffered about $3,000 loss by fire.

WORCESTER, MASS. — The Rockwood Sprinkler Co., 38 Harlow street, will build a 2-story, 114 x 240-foot sprinkler factory.

WORCESTER, MASS. — Fire at Morgan Spring Co.'s plant caused considerable damage in tempering department.

WORCESTER, MASS.—Halstead Machine Co. has been incorporated to manufacture automatic grinding machines; $50,000 capital stock; by Neil M. McEachearn, Frederick H. Halstead and Thomas J. Bowen.

WORCESTER, MASS.—L. W. Pond Machine & Foundry Co. will extend its capacity by occupying, in addition to its present plant, the building which has been used by the Parker Wire Goods Co., and which recently was damaged by fire. The Parker company now is moving its machinery and business into the Osgood-Bradley building, where an entire floor has been rented.

WORCESTER, MASS. — Walker Grinder Co., and O. S. Walker & Co., manufacturers of special machinery and magnetic chucks, have been consolidated and incorporated with a capital stock of $90,000 as the O. S. Walker Co. The incorporators are: O. S. Walker, president and treasurer: Isaac F. Williams and J. Fred Humes. No additional buildings or equipment are contemplated at present.

BRIDGEPORT, CONN.—Grant Mfg. Co. is in the market for a shaper.

BRIDGEPORT, CONN.—East Side Foundry Co. has been incorporated; $10,000 capital stock; by Eleanor A. Keiber, Philip Keiber and Charles Phillips.

BRIDGEPORT, CONN.—Connecticut Metal Treating Co. has been incorporated; $1,100 capital stock; by Guy L. Hammond, William J. Van Sciver, secretary, and John Smith.

MIDDLETOWN, CONN.—Utopia Mfg. Co. has been incorporated; $50,000 capital stock; by Frederic S. Bacon, Daniel A. Reed and Reginald W. Willard, the latter of Meriden, Conn.

NEW HAVEN.—New Haven Pulp & Board Co. has purchased property for the erection of an addition to its plant.

WATERBURY, CONN. — Chase Metal Works, Thomaston avenue, will begin work at once on a 1-story 60 x 80-foot addition.

WATERVILLE, CONN. — Rowbottom Machine Co., manufacturer of special machinery will about double the size of its present plant. Work on a new building is to be started immediately.

PAWTUCKET, R. I.—Robert C. Reetz Co., sheet metal, has been incorporated; $8,000 capital stock; by Robert C. Reetz, William Luescher and George F. Neuman.

PROVIDENCE, R. I. — American Emery

Wheel Co. is having an additional story, 45 x 99 feet, put on to its 1-story, brick building on Waterman and East River streets.

PROVIDENCE, R. I. — Providence Engineering Co. is figuring on a shrapnel contract and has inquiries out for a considerable quantity of shrapnel-making equipment.

PROVIDENCE, R. I.—Pilgrim Shoe Machinery Co., manufacturer, has been incorporated; $100,000 capital stock; by Harry B. Barnside, Harry F. Heustis and Nicholas S. Winsor.

PROVIDENCE, R. I. — American Locomotive Co. has decided to reopen its plant in Providence, which has been idle since the discontinuance of the manufacture of automobiles, two years ago. The plant will be employed for the manufacture of shrapnel parts.

BALDWINSVILLE, N. Y.—A spark from the foundry cupola started a fire which caused considerable damage at the plant of the Morris Machine Works.

BROOKLYN. — Eiseman Magneto Co., Bush Terminal, has bought several machine tools and continues in the market.

BUFFALO. — Curtis Plated Aluminum Co. has been incorporated; $50,000 capital stock; by A. C. Towne, D. Clinton and G. O. Curtis, 805 West Ferry street, Buffalo.

BUFFALO. — Automobile - Aviation Industries, motors, engines, machinery, air and water craft, has been incorporated; $10,000 capital stock; by H. F. Sanford, E. P. and E. S. Leitze, 350 Franklin street, Buffalo.

CANTON, N. Y.—Town clerk will receive bids until 2 p. m., May 28, for removing the superstructure of present bridge over Grasse river at Morley and furnishing and erecting superstructure of a new steel truss bridge, with two spans of 80 feet each. Bids also will be received on that date for removing superstructure of bridge over Granis brook and erecting steel truss bridge, with one span of 46 feet; each proposal requires a certified check of 10 per cent.

NEW YORK.—Tropenas Converter Co., 50 Church street, is inquiring for four projectile presses.

NEW YORK.—Gabriel & Schall, 205 Pearl street, are planning to build asphalt plants at Newmarket, N. J., and Binghamton, N. Y.

NEW YORK.—C. K. Turner & Son, 116 Broad street, have inquiries out on a large quantity of projectile-making equipment.

NEW YORK.—J. S. Johnston & Co., 68 Broad street, are in the market for a large number of machine tools, including equipment for making projectiles.

NEW YORK.—Independent Electric Light & Power Co. has been incorporated; $100,000 capital stock; by Alex Werner, Helen White, Meyer Klein, 817 West End avenue.

NEW YORK.—R. B. Stanley Mfg. Co., motors, engines, machinery, engineering appliances, has been incorporated; $10,000 capital stock; by G. B. Palmer, A. D. and Rolof B. Stanley, 11 East Forty-eighth street.

NEW YORK.—W. E. Welborne who is staying at the Hotel McAlpin having just come to this country from Russia is inquiring for a large number of lathes and milling machines.

NEW YORK.—Bellevue and Allied Hospitals, 415 East Twenty-sixth street, have let contract for a machine room and power house on Lenox avenue between 136th and 137th streets. J. H. Freedlander, 244 Fifth avenue, architect.

NEW YORK.—J. S. Hopper, 140 Broadway, is in the market for about 1,000 machine tools, including milling machines, profile machines, barrel turning machines, rifling machines, stocking machines, automatic chucking and turning machines and grinding machines.

OLEAN, N. Y.—Clark Bros. are figuring on a shrapnel contract and have inquiries out for about 12 machine tools.

SCHENECTADY, N. Y.—Jas. Tobin, 839 Strong street, is about to begin work on a 1-story, 40 x 60-foot automobile repair shop.

TARRYTOWN, N. Y. — Chevrolet Motor Co. of New York, Inc., is figuring on buying a few machine tools.

UTICA, N. Y.—Munson Mill Machinery Co., capital $25,0000, will take over the business of Munson Brothers Co., which is to cease manufacturing grain mill apparatus. The directors are. George W. Lasher, New Hartford, N. Y.; G. A. Bowman, A. L. Williams, Utica.

ARDMORE, PA.—Autocar Co. is receiving bids on an addition to its plant.

CONNELLSVILLE, PA.—Rice Coal & Coke Co., capital $5,000, has been incorporated by H. C. Griffin, R. M. Hillwagon and John H. Rice, all of Connellsville.

HARRISBURG, PA.—Fred A. Havens Co., Philadelphia, has contract for erecting several 1 and 2-story buildings here for W. O. Hickok Mfg. Co. The buildings include an office, main building, storage building, foundry, pattern storage and a lumber shed.

IRWIN, PA.—Irwin Herminie Traction Co. has completed a survey of a proposed line from Irwin to Manor; S. A. Stewart is the engiher in charge.

NEW CASTLE, PA.—City Engineer Milholland will prepare plans for the construction of a bridge at Jefferson street, over Neshannock creek, which will be 25 feet longer than the structure replaced.

NEW CASTLE, PA.—The main building of the Standard Steel Car Co.'s plant at this city was damaged by fire May 13; loss estimated at $10,000. The shearing, pressing and punching department suffered greatest loss. The main offices of the company are in Pittsburgh.

NEW CASTLE, PA.—Federal Radiator Co. has taken over the plant of the Penn Motor Co., New Castle, Pa., which will be used for the manufacture of steam and hot water boilers and radiators. Several new buildings will be built and equipped. Incorporators of the Federal company are: Parker H. Cunningham, David Jameson, both of New Castle; and C. F. Morrow, Pittsburgh.

PHILADELPHIA.—Morris L. Cooke, director of department of public works, 216 City Hall, will receive bids until May 25 for an air compressor.

PITTSBURGH. — American Sanitary Mfg. Co. has been incorporated; $10,000 capital stock; by W. Bayne Lautenslager, Jesse L. Coleman, Pittsburgh, and others.

PITTSBURGH.—Pittsburgh Engineering Co., capital $15,000, has been incorporated by C. Howard Hoak, Herbert Moffitt, Pittsburgh, and William J. Burkhart, Latrobe, Pa.

PITTSBURGH.—The plant of the Union Foundry & Machine Co., south side, Pittsburgh, was badly damaged by fire recently; F. H. Zimmers is in charge.

PITTSBURGH.—Carl M. McKee, superintendent of supplies, board of education, will open bids May 27 on school supplies including $20,000 worth of small tools for the manual training department.

PITTSBURGH.—Allegheny county commissioners will invite bids this week for building traffic tunnel through Mt. Washington. Commissioner J. Denny O'Neol advocates early completion of the project.

PITTSBURGH.—Aluminum Co. of America has completed plans for an extension to its plant at New Kensington, Pa.; the building involving 440 tons will be erected by the McClintic-Marshall Co., Pittsburgh; some new equipment will be installed.

SEWICKLEY, PA.—John B. Semple & Co., ordnance, ammunition, etc., has been incorporated; $5,000 capital stock; by Frank Semple Jr., Eleanore S. Semple, S. D. Cushing and John B. Semple.

YORK, PA.—County commissioners are asking bids on five bridges, four of which will be reinforced concrete construction.

BELLEVILLE, N. J.—Plant of Dielectric Co. of America, here consisting of several buildings on Cortlandt street has been leased to the Pathe Freres Phonograph Co., which will manufacture a talking machine known as the Pathephone.

BLOOMFIELD, N. J.—Sims Magneto Co. has bought about 10 machine tools and continues in the market.

CAMDEN, N. J.—Chemical plant of Mechling Bros. Mfg. Co. suffered heavy damage by fire.

HARRISON, N. J.—Hyatt Roller Bearing Co. has bought a few machine tools and is in the market for some additional equipment.

METUCHEN, N. J.—T. A. Gillespie Co., 50 Church street, New York, will start work here immediately on a large powder mill, to be located near Metuchen.

SPOTSWOOD, N. J.—Lake Ruth Industries will erect a plant in Spotswood to manufacture rubber goods. J. C. Denelsbeck, Trenton, is president.

TRENTON, N. J.—Ajax-Grieb Rubber Co. is about to build a 1-story, 28 x 83-foot addition.

UNION HILL, N. J.—J. E. Vroman Co., engineering, brass founding, etc., has been incorporated; $100,000 capital stock; by Julius E. and Leontine Vroman, North Bergen, N. J.; George W. and William V. Bechtold, Jersey City, N. J.

BALTIMORE.—Poole Engineering Co. is inquiring for a considerable quantity of shrapnel-making machinery.

BALTIMORE. — Prudential Oil Co. has awarded a contract to Coggswell-Koether Co. for the erection of a 1-story, 48 x 164-foot reinforced concrete boiler house at the company's plant at Wagners Point.

BALTIMORE.—Shawinigan Electro Products Co. will build a plant at once adjoining the property of the Pennsylvanina Water & Power Co. in Highlandtown for the manufacture of ferro-silicon and calcium carbide; capacity 10,000 to 20,000 tons yearly. The company has a subscribed stock of $250,000.

HAGERSTOWN, MD. — Hoch Mfg. Co.'s new foundry badly damaged by fire.

WASHINGTON.—Bids will be received by the bureau of yards and docks, navy department till June 12 for ship building cranes for the Norfolk navy yard.

WASHINGTON.—Bureau of supplies and accounts, navy department, is taking bids till June 1 for a 70-inch swing, engine lathe for the Washington navy yard; until June 8 for an 8-foot radial drill for the Mare Island navy yard.

WASHINGTON.—Bureau of supplies and accounts, navy department, will receive bids until May 25 for an air compressor for the Washington navy yard; for an automatic grinder, pulleys, band saws, swing type cutoff saw, etc., for the Brooklyn navy yard; steam drop hammer for the Norfolk navy yard, heavy duty engine lathes for the Charlestown, N. C., navy yard and a forced draft blower for the Boston navy yard.

CENTRAL STATES

AKRON, O.—B. F. Goodrich Co. has retained the Osborn Engineering Co., Cleveland, to prepare plans for a $1,000,000 addition to be erected north of the present plant.

BUCYRUS, O.—It is reported the Sommer Motor Co., manufacturer of Allen cars, will erect a brick factory addition and install machinery to double the capacity of the plant. L. A. Sommer is president of the company.

CANTON, O.—Gordon Rubber Co. will hold a meeting June 10 to vote on increasing the stock from $300,000 to $600,000 for the addition of new buildings and shops.

CINCINNATI.—Equipment will be needed

by the St. George's Roman Catholic church, Corryville, which will erect an $8,000 boiler house.

CINCINNATI.—Queen City Iron Bed Co., manufcturer of iron folding beds, has moved from 18 West Second street, to 26 West Third street, the latter property has been leased for ten years.

CINCINNATI.—No equipment has been purchased as yet for the proposed $50,000 factory building to be erected by the D. Gruen Sons Co., watch case manufacturer, at Reading road and McMillan street.

CINCINNATI.—Ohio Contracting Co. has been incorporated; $75,000 capital stock; by John W. Butler, L. G. Jennings, Joseph Lemkuhl, Dudley R. Howard and Charles T. Ryan.

CINCINNATI.—Universal Metal Fence Post Co., recently incorporated at $5,000, to manufacture iron and steel fence posts, has not as yet purchased equipment. The incorporators are: L. K. Slaback, G. G. Maclaughlin, William R. Evans and Herman R. Bayless.

CINCINNATI.—Light machine shop equipment will be needed by the Automobile Rebuilding & Sales Co. which has been incorporated with a capital stock of $5,000. The incorporators are: A. A. Heinzman, W. C. Junglas, Frank Kirgan, R. E. Morrison and J. E. Duecman.

CINCINNATI.—Century Machine Co. has leased plant formerly occupied by the Modern Machine Tool Co., Winton Place, and will manufacture molding machines for bakers. The company was started several months ago on a trial basis, but now will be made a permanent organization. William Tuechter is president of the company.

CLEVELAND. — Samuel Austin Co. will make alterations, costing about $3,500, at the plant of the Standard Welding Co., 1245 West Seventy-sixth street.

CLEVELAND.—Union Safety Appliance Co. has been incorporated; $10,000 capital stock; by Robb O. Bartholomew, Howard Blackett, E. H. White, William E. and E. C. Simpson.

CLEVELAND.—Mentz & Hoffman Pattern Mfg. Co., brass products, has leased the new building at 1519 East Thirty-eighth street and plans to occupy the new quarters June 1.

CLEVELAND.—Reliance Gauge Column Co., manufacturer of safety water column devices, has taken over the Cleveland Clutch Co. and the machinery will be removed from the plant of the latter at Urbana, O., to the new Reliance plant at 5902 Carnegie avenue.

CLEVELAND.—American Ship Building Co. has applied for permits amounting to about $100,000 for the erection of three buildings at Crescent avenue N. W. and West Fifty-fourth street. The structures are: One $35,000, 2-story office building; one 2-story, brick and concrete pattern shop and storage building and a 120 x 280-foot, steel constructed foundry and machine shop.

CLEVELAND.—Cleveland White Metal Co., recently incorporated at $250,000, will build shortly, at an estimated cost of $75,000, the first unit of what will be a $200,000 plant for the manufacture of white metal. The company is looking for a site along the Belt Line, in East Cleveland. George Huberty is to be president and J. J. Adler general manager, according to E. P. Strong, attorney, who perfected the organization.

COLUMBUS, O.—Automatic Tank Mfg. Co. has been incorporated; $50,000 capital stock; by F. E. Shaw, C. H. Korns, W. F. Shaw, J. L. Gotschall and Thomas J. Croak.

COLUMBUS, O. — Thomas Automatic Fire Engine Co. has been incorporated; $100,000 capital stock; by John A. Thomas, Chalmers C. Moore and Samuel A. Hoskins.

DAYTON, O.—Oakwood Water & Light Co. has increased its capital stock from $10,000 to $100,000.

DAYTON, O.—City Tool & Machine Co. has taken a long-time lease on the Flushing building, which is adapted for light manufacturing.

ELYRIA, O.—F. L. Ellenberger, clerk of county commissioners, will open bids June 2 for constructing superstructure of the Cowle-Miller bridge in Wellington township. F. T. Cross, county surveyor, has plans. A certified check for $300 is required.

LEBANON, O.—John M. Mulford, county auditor, will open bids June 5 for a low steel bridge over north branch of Turtle creek in Lebanon; plans are with the county commissioners. A $1,000 bond will be required.

MARYSVILLE, O.—Boss Washing Machine Co., Cincinnati, is considering the location of a large plant in Marysville.

MARYSVILLE, O. — County auditor says there will be a hearing on May 24 to decide on construction of Jones bridge in Claybourne township, Temple bridge in Washington township and Ford bridge in Taylor township.

MIDDLETOWN, O.—Lieb Auto Wheel Co. has been incorporated with a capital stock of $5,000, to manufacture a patented automobile wheel. The incorporators are: I. T. Geary, F. W. Lieb, E. L. Sherman, Albert Auberle and P. E. Linzie.

LIMA, O.—East Iron Machine Co., Jackson and Market streets, plans the erection of a $75,000 plant next spring at Cole street and the Pennsylvania tracks. Sketches include an erecting shop, 60 x 500 feet, with traveling crane, boiler shop, power house and other buildings.

NORWALK, O. — Charles E. Bloomer, county auditor, will open bids June 8 for bridge construction; plans with county engineer; certified check $100 required.

OTTAWA, O. — John E. Roose, county auditor, will open bids June 8 for a 1-span bridge, 40 feet, across Plain creek at Sycamore street, Columbus Grove.

PORTSMOUTH, O. — Contracts for the grading and masonry work for 28 miles of railroad for the Chesapeake & Ohio Northern railroad, to extend from the Ohio river to Waverly, O., involving an expenditure of $3,500,000 have been tentatively awarded the Robert Grace Contracting Co., Pittsburgh, W. W. Boxley & Co., Roanoke, Va., and Rinehart & Dennis Co., Charlottesville, Va.

SPRINGFIELD, O.—Steel Transfer Case Co. has been incorporated; $10,000 capital stock; by Malcolm J. Altschul, J. A. Altschul, L. M. Frankenbert, William H. Cochran and Hiram Stern.

SPRINGFIELD, O.—R. A. Dennis and W. B. Williams, Middletown, representing the Rustler Mfg. Co., recently incorporated at Middletown to manufacture farming implements, have leased the third floor of the American Concentrator Co.'s building at Isabella and Columbia streets. A full statement of the company's intentions will be announced about Sept. 1.

TOLEDO, O.—American Steel Tube Co. has been incorporated; $1,000 capital stock; by J. E. Cauffiel, P. A. Dischinger, Fred E. Feige, D. W. Cauffiel and Alonzo G. Duer.

YOUNGSTOWN, O. — Plans and specifications for the McKinley Birthplace Memorial, Niles, O., are being asked by J. G. Butler Jr., who is in charge of the undertaking.

YOUNGSTOWN, O.—The plants of the National Enameling & Mfg. Co. and the Youngstown Car & Mfg. Co. were badly damaged by fire recently; total loss $20,000; William Wilkoff, president of both concerns, announces plants will be rebuilt.

FAIRMONT, W. VA. — J. L. Crouse, Greenswood, N. C., is the lowest bidder for the state normal school building, 85 x 250 feet, to be erected in Fairmount. The building will be of fireproof construction throughout and will cost $110,000; Paul A. Davis, architect, Philadelphia, has the plans.

HUNTINGTON, W. VA.—Paul Hardy, R. P. Aleshire and others are understood to have formed the Huntington Alloy Co., to erect a plant for the manufacture of alloys and the reduction of ores, etc.

PARKERSBURG, W. VA.—Great Southern Mfg. Co., aluminum ware, will locate in the former quarters of Okey J. Stout & Co.; a plant probably will be erected shortly. The main factory is at New Orleans. C. B. Welch is local manager.

WHEELING, W. VA.—Major T. H. Jackson, United States engineer, will take bids until June 2 for water turbines, air compressors, valve jacks and gate winches, etc., for dams Nos. 15 and 19, Ohio river.

LANCASTER, KY.—A. H. Bastin & Son will purchase power and woodworking equipment for a planing mill, which will be erected shortly.

LANCASTER, KY. — Lancaster Electric Light Co. is planning to offer 24-hour service and will enlarge the capacity of the plant; Alex Walker is in charge.

LOUISVILLE, KY. — Columbia Sanitary Mfg. Co. will install 135-horsepower in motors in its new plant, now being completed; George H. Laib is in charge.

LOUISVILLE, KY.—Additional equipment to provide an increase in capacity of 50 per cent will be purchased by the Foreman-Breen Mfg. Co., saddlery and harness, which will move shortly to a new building.

LOUISVILLE, KY.—The operation of plant of Continental Car & Equipment Co., at Highland Park, which was shut down when the company went into bankruptcy, will be resumed by the Continental Car Co., which has been incorporated with $40,000 capital stock by A. H. McKinley and others.

MT. OLIVET, KY.—Robertson County Light & Power Co. will purchase equipment for a 60-horsepower electric light plant and now is getting prices.

OWENSBORO, KY.—H. M. Daniel, Gulfport, Miss., will establish a furniture factory. A $20,000 company is being organized to manufacture a patented specialty.

PADUCAH, KY.—The city commission will purchase a 6,500-gallon oil tank; address L. A. Washington, commissioner.

TOMPKINSVILLE, KY.—J. R. White, L. W. Preston and E. H. Smith, Glasgow, Ky., who have purchased the electric light plant and ice factory in Tompkinsville, will install a waterworks plant.

ANDERSONVILLE, IND. — Andersonville Foundry & Machine Co. has planned a brick and concrete addition. J. W. Rose, president.

AUBURN, IND.—Charles Wagoner, county engineer, has prepared plans for a 60-foot and a 120-foot, steel bridge. A. W. Madden is county auditor.

BLOOMINGTON, IND.—Daggett & Daggett, Indianapolis, have the general contract for the erection of a $150,000 gymnasium for the University of Indiana.

COLUMBUS, IND. — A $15,000 heating plant will be installed in the courthouse; address the county commissioners.

MARION, IND.—Western Drop Forge Co. is planning an increase in its steam power plant of 700 horsepower; address R. L. Sieberling.

MT. VERNON, IND.—County commissioner will advertise about July 1 for several steel and concrete bridges, J. R. Haines, county auditor.

NORTH VERNON, IND.—King Mfg. Co. has been incorporated to manufacture seed cleaning machinery; $10,000 capital stock; by N. M. King, J. M. King and E. E. Walker.

RICHMOND, IND. — National Automatic Tool Co. has leased additional space in the Gaar-Scott Co.'s factory for the manufacture of tool products.

TERRE HAUTE, IND. — Indiana Coke &

Gas Co. has increased its capital stock $2,490,000.

VINCENNES, IND. — Vincennes Gate Co. has been incorporated to manufacture gates; $25,000 capital stock; by M. and J. A. Riddle.

AURORA, ILL.—Bids will be received until May 28, by Israel Doan, for the erection of a pumping station.

BELLEVILLE, ILL. — Cabirange Mfg. Co. has been incorporated to manufacture stoves and ranges; $7,500 capital stock; G. D. Klemmie, George A. Kloess and Julian Kohl.

CHICAGO.—Methodist Book Concern, South Michigan avenue, Chicago, has decided to erect a $275,000, 6-story building.

CHICAGO.—Pennsylvania railroad has let contract for its new freight terminal in Chicago to the Glones-Sinek Co. of Chicago.

CHICAGO.—International Tailoring Co. has bought a site at Jackson boulevard and Peoria street, 116 x 125 feet, and will erect a $250,000, 10-story fireproof building.

CHICAGO.—Newport Boiler Co. has been incorporated; $20,000 capital stock; by Charles F. Newport, Jules B. Beruet and J. Herbert Newport, 203 South Dearborn street.

CHICAGO.—Chicago Screw Co., 1024 South Homan avenue, is building a 3-story addition to its plant at a cost of about $35,000; Postle & Fischer are architects.

CHICAGO.—Smokeless Burner Co. has been incorporated; $50,000 capital stock; by A. C. Fischer, D. C. Thorsen and George A. Chritton, 140 South Dearborn street.

CHICAGO. — Burrell Engineering & Construction Co., 323 South La Salle street, has increased its capital stock from $50,000 to $100,000.

CHICAGO.—Marshall & Fox, architects, 838 South Dearborn street, are preparing plans for the Chicago Athletic club for a $2,000,000 club house, 18 stories, steel construction.

CHICAGO.—Western Plumbing Supply Co., 117 North Desplaines street, will start construction about July 1 on a $60,000, 2-story, 120 x 125 foot warehouse and office building.

CHICAGO.—Bids will be received until June 1, by Thomas Rood, chief engineer, 521 West Adams street, for a trunnion bascule bridge at Monroe street, part of the Union terminal station.

CHICAGO. — MacMurray Steel Hoop Co., has been incorporated to manufacture steel hoops and similar products; $50,000 capital stock; by S. W. Areson, H. G. Merrell, 5429 Ingleside avenue and H. H. Onstott, 4643 Lake Park avenue.

CHICAGO. — New York, Chicago & St. Louis railroad has let a contract to the Pennsylvania Steel Co. for a 5-span bridge over the Illinois Central tracks at Seventy-ninth street to be completed Nov. 1. This is the last of the grade elimination work of this company.

CHICAGO.—Chicago & Northwestern railroad has bought property at Calumet river and 120th street which is said to be the site for the proposed 4,500,000-bushel grain elevator to be built for the Armour Grain Co. W. H. Finley, Chicago, is chief engineer for the railway. Preliminary plans are said to have been completed and placed in the hands of engineers for detail work.

DANVILLE, ILL.—Henry Bireline Co. has been incorporated to manufacture and install metal works; $25,000 capital stock; by Henry Bireline, Walter Meck and Robert F. Bireline.

ELIZABETH, ILL.—Elizabeth Light & Power Co. has been incorporated; $6,600 capital stock; by Bernhard Dittmar, J. C. McKenzie and S. P. Raynolds.

KANKAKEE, ILL. — Kankakee-La Fayette Railway Co. will start construction shortly on a railway between Kankakee and La Fayette. O. L. Brown is general manager.

LA SALLE, ILL.—La Salle Railway Co. is making surveys for a railway to Oglesby. B. M. McDonald, Chicago, is secretary.

MOUNT VERNON, ILL.—Mount Vernon Machine & Motor Co. has been incorporated; $50,000 capital stock; by D. P. Settlemire, Logan E. Mayfield and Robert C. Smith.

QUINCY, ILL.—Bush Foundry & Metal Wheel Co. has been incorporated; $40,000 capital stock; by Thomas L. Tushaus, Arnold Scott and Alfred Kimlin.

ROCKFORD, ILL.—A bond issue of $85,000 has been voted to erect a bridge at Morgan and Bluff streets and $34,500 for three bridges over Keith's creek.

SPRINGFIELD, ILL. — Meyers Stein, 705 East Washington street, is about to erect an addition to his factory, consisting of a machine shop to cost $7,000.

SPRINGFIELD, ILL.—Hart Mfg. Co. has been incorporated to manufacture machinery, tools and various metal devices; $50,000 capital stock; by John E. Hart, Charles R. VanWinkle and Fred D. Silloway.

ST. CHARLES, ILL. — Western Seamless Pail Co. has been incorporated to manufacture sheet metal work; $10,000 capital stock; by John H. Andrews, Francis Adams Jr. and George V. Price.

WEST FRANKFORT, ILL. — Cornelius Richardson, mayor, is having plans prepared for a water works plant costing $20,000 for which a bond issue has been voted.

AHMEEK, MICH.—A water works system is being planned with a pumping plant at Allouez Mills this summer, costing $20,000.

ANN ARBOR, MICH.—Manly Osgood, city engineer, has tentative plans for a municipal electric plant to light streets and public buildings at an estimated cost of $55,585.

DETROIT.—Taylor Mfg. Co., pumps, etc., has been incorporated; $50,000 capital stock; by Huston Taylor, Frederick E. Searle, S. P. Bradley and E. H. Tillepsen.

DETROIT.—Transport Co. has increased its capital stock from $5,000 to $50,000 and changed its name to the Bostaph Engineering Co.

DETROIT.—Scott Brothers Electric Co., 34 Macomb street, is to build a $12,000 factory, four stories, 25 x 115 feet. Pollman & Ropes, 602 Sun building, are architects.

DOWAGIAC, MICH.—This city is considering borrowing $12,000 for a new engine and electric generator in the electric light plant.

GRAND RAPIDS, MICH. — Plans have ben completed by L. E. Stevens, city engineer, for a steel and concrete bridge over the Grand Trunk railway at College avenue.

GRAND RAPIDS, MICH.—Bids will be taken until May 28 by Jacob Glerum, county clerk, on five 85-foot pony trusses, a movable truss, 70-foot clear waterway, piers and abutments.

GRAND RAPIDS, MICH. — Robinson & Campau, 449 Houseman building, have prepared plans for Crathmore Hotel Co., L. H. Mahotens, president, for a 6-story, steel frame hotel building, 90 x 120 feet, built to carry four additional stories. Estimated cost is $750,000.

KALAMAZOO, MICH.—Guy C. Crane, Lansing, Mich., municipal light expert, has been called into conference with city officials, who plan entering the commercial lighting business.

MUSKEGON, MICH.—Cast Iron Plumbing & Steam Mfg. Co. will erect a $12,000 addition to its plant.

MUSKEGON, MICH.—Bradley & Ankebrant Co. has been incorporated at $15,000 capital stock to manufacture cast iron plumbing and steam goods.

ST. JOSEPH, MICH.—Engberg's Electric & Mechanical Co. is planning a $20,000 foundry and machine shop.

ASHLAND, WIS.—It is reported the Appleyard interests are considering the con-

Note These Notes

Life is just one blamed note after another.

You wrote them to the girl across the aisle in that little old red school house—

You may have kept them on your cuff when taking exams—

You usually need them when starting in business—

You complain when Miss Nightingale, your neighbor, hits a high one—

You may have to send one to Germany some day—

You SHOULD read those in this column each week—

NOTE THESE NOTES

J. S. Hopper, 140 Broadway, New York City, is in the market for about 1,000 machine tools, including milling machines, profile machines, barrel turning machines, rifling machines, stocking machines, automatic chucking and turning machines and grinding machines.

Clark Bros., Olean, N. Y., is figuring on a shrapnel contract and have inquiries out for about 12 machine tools.

Tropenas Converter Co., 50 Church street, New York City, is in the market for four projectile presses.

Federal Radiator Co., which has taken over the plant of the Penn Motor Co., Newcastle, Pa., for the manufacture of steam and hot water boilers and radiators, will erect and equip several new buildings. The incorporators of the Federal company are: Parker H. Cunningham, David Jameson, both of Newcastle, and C. F. Morrow, Pittsburgh.

The Pittsburgh board of education will take bids May 27 on about $20,000 worth of small tools for the manual training departments.

W. E. Welborne, who has just arrived from Russia and is staying at Hotel McAlpin, New York City, is inquiring for a large number of lathes and milling machines.

J. S. Johnston & Co., 68 Broad street, New York City, are in the market for a large number of machine tools, including equipment for making projectiles.

Chevrolet Motor Co. of New York, Inc., Tarrytown, N. Y., plans buying a few machine tools.

Poole Engineering Co., Baltimore, is in the market for a considerable quantity of shrapnel-making machinery.

Providence Engineering Co., Providence, R. I., contemplates a shrapnel contract and has inquiries out for a large quantity of shrapnel-making equipment.

C. K. Turner & Son, 116 Broad street, New York City, has inquiries out for a large quantity of machinery for making shells.

Grant Mfg. Co., Bridgeport, Conn., is in the market for a shaper.

struction of a 10,000-kilowatt hydro-electric plant on a site not divulged and a 5,000-kilowatt steam turbine plant at Ashland. Arthur E. Appleyard, Ashland, is vice president and manager.

BELOIT, WIS.—Solicitation for backing for the establishment of a gas tractor plant is being conducted by Roy K. Townsend and John Null of Beloit, Wis., who have developed a successful farm device of this type.

BRODHEAD, WIS.—Brodhead Latch Co., manufacturing light hardware, is planning on increasing its capacity, having contracted with Hibbard, Spencer & Bartlett Co., Chicago, for the distribution of its entire output.

CLINTONVILLE, WIS.—The machine shop and garage building of the South Side Machine works were badly damaged by fire, the loss of $13,000 being covered by insurance. The plant is to be rebuilt.

DePERE, WIS.—The city clerk will advertise soon for bids for rebuilding the Main street bridge estimated to cost $21,000. J. Steckart, mayor.

KENOSHA, WIS.—The city council is considering plans for a new pumping station on Washington island.

LADYSMITH, WIS. — Schram Mfg. Co., furniture and hardwood products, which is to move to Ladysmith from Oshkosh, Wis., has awarded the general contract for the erection of a 4-story, brick factory, 60 x 132 feet, to W. E. Bolley, Oshkosh.

MADISON, WIS. — Hydraulic engineers have recommended a water works addition costing $200,000, which includes enlargement of the pumping station and equipment.

MANITOWOC, WIS.—The board of education has instructed Earle F. Miller, architect, to advertise for a $15,000 central heating, lighting and power plant for the high school.

MAYVILLE, WIS. — Wisconsin Slag Co. has been organized at $25,000 to manufacture a by-product of waste material from the furnaces of the Northwestern Iron Co., Mayville. J. M. Druecker, F. I. Weiland and Maurice A. McCabe, attorney, appear as incorporators.

MENOMINEE FALLS, WIS.—The waterworks committee urgently recommends installation of a new reservoir, consisting of a 75,000-gallon, steel tank, mounted on a 50-foot tower. C. W. Schafer is chairman.

MILWAUKEE.—A. C. Class, Colby Abbott building, architect, is drawing plans for a $400,000, 5-story hotel, 100 x 200 feet. Owner's name withheld.

MILWAUKEE.—Armand D. Koch, architect, Wells building, will award a contract soon for a 10-story, steel building, 80 x 135 feet, for the Ticonic Investment Co.

MILWAUKEE.—Gothal Blow Pipe & Ventilator Co. has been incorporated; $2,000 capital stock; by P. J. Smith, Edward Smith and Kate S. Gothal.

MILWAUKEE.—Alfred W. Fuchs will erect a concrete garage and repair shop, one-story, L-shaped, 20 x 50 and 18 x 35 feet, at 1403 Green Bay avenue, according to plans by Leiser & Holst, architects.

MILWAUKEE. — Federal Malleable Iron Co., reported to have important improvements to its equipment under way, also will erect a 2-story, brick and concrete, 50 x 70-foot structure, to embody pattern vaults and offices.

MILWAUKEE. — Modern Pattern Co. has been incorporated at $2,500 to operate a pattern works. The incorporators are George Kohlhardt, Clarence Romiller and Paul R. Newcomb.

MILWAUKEE. — Alex G. Goethel Sheet Metal Works Co. has been incorporated at $25,000 to manufacture blowers and ventilating systems and all kinds of sheet metal devices. The incorporators are Alex G. Goethel, E. G. Keller and Fred A. Landeck, attorney.

MILWAUKEE.—H. C. Webster, consulting engineer, Milwaukee, is preparing plans for the village of North Milwaukee for waterworks main extensions that will require about 5,500 lineal feet of 12-inch and 1,500 feet of 8-inch cast iron water pipe.

MILWAUKEE. — Demerath Two Minute Quick Adjustable Rim Co. of Milwaukee has been incorporated with a capital stock of $25,000 to manufacture resilient wheels and rims for automobile and motor trucks. The inventor, Joseph B. Demerath, Dr. E. M. Sullivan, Theodore Sternemann and Theodore Naus are the promoters.

MILWAUKEE. — Plans for the new Main exchange of the Wisconsin Telephone Co. in Milwaukee, which was to have been built early this year, are being changed following the purchase of additional frontage on Broadway, making available a site 120 x 120 feet. Work will be started late in the fall. Alex C. Eschweiler, Goldsmith building, is now revising plans. H. O. Seymour is general manager.

MILWAUKEE. — The common council has passed ordinances enabling the construction of a manufacturing plant on the site bounded by Prospect avenue, Kenilworth place and the Chicago & North Western railroad tracks, and the Ford Motor Co., Detroit, will begin work at once on a 5-story shop, 120 x 300 feet, costing about $250,000. It will employ 400 men and turn out 20,000 to 25,000 Ford cars annually. The company's architects at Detroit will have charge of the project.

OSHKOSH, WIS. — Dauber-Bell Machine Co., has increased its capital stock from $30,000 to $50,000.

OSHKOSH, WIS.—Robert W. Mackie, president of the defunct Davis Threshing Machine Co., Oshkosh, has purchased the property at trustee's sale for $2,700 and will organize a new company to resume the business. It is said that activity will be confined principally to the production of manure spreaders and similar farm equipment.

RACINE, WIS.—Wisconsin Metal Products Co. has been incorporated with $20,000 capital stock by J. H. Dwight, Taylor Jelliffe and Arthur R. Janes.

SUPERIOR, WIS.—The municipal board of health will install a garbage incinerator to cost about $10,000. Dr. C. M. Gould is health commissioner.

WATERLOO, WIS.—Waterloo Novelty Co. has been organized with $10,000 capital to take over the vehicle department of the Drew Carrier Co., litter carriers and barn equipment. The new concern also will manufacture other lines and has leased the entire second floor of the Drew shops as a factory. C. F. Nisle is president and J. E. Alling general manager.

WAUKESHA, WIS. — I. B. Powell Mfg. Co., T. Breese, manager, has postponed building its projected foundry until 1916. This structure was to be one story 100 x 125 feet, to cost $50,000.

WAUKESHA, WIS.—Federal Bridge Co., which recently changed its corporate style from Modern Steel Structural Co., is preparing to manufacture a line of light steel farm tractors recently developed by its engineering staff.

WAUKESHA, WIS. — Spring City Foundry Co., which increased the size of its plant last fall, is obliged to make further extensions because of an increased demand for grey iron cylinder castings for the Waukesha Motor Co., which is doubling the size of its work in Waukesha.

FABINES RIVER, MO. — J. A. Dering, president of the Fabines River Drainage district, Taylor, Mo., is having plans made for a pumping station, by the Harmon Engineering Co., 120 Fredonia building, Peoria, Ill.

HIGGINSVILLE, MO.—This city is about to buy a 250-kilovolt ampere generating unit, switchboard and constant-current transformer. D. Riepe is superintendent.

KANSAS CITY, MO.—Bids will be received soon on a steel viaduct at Eighteenth street, 1,383 feet long, with roadway 36 feet wide and side walks; roadway will be paved with creosoted blocks; estimated cost $170,000.

KANSAS CITY, MO. — Ridenour-Baker Grocery Co. is to build a 9-story warehouse, 120 x 180 feet, for which bids will be taken about June 1 by McKeknie & Tresk, 803 Lathrop building.

ST. JOSEPH, MO.—E. J. Johnson Adjustable Bed & Sanitary Couch Mfg. Co. has been incorporated to manufacture beds and couches; $100,000 capital stock; by E. J. Johnson, Perry Ennycart and A. H. Mitchell.

ST. LOUIS.—Briquette Fuel Co. has been incorporated; $12,000 capital stock; by C. A. Marquis, P. S. Marquis and L. G. Breitmey.

ST. LOUIS.—Orpheum Theatre Co., 1564 Broaway, N. Y., is having plans prepared for a $1,000,000 theatre at St. Louis. Louis A. Cells, of St. Louis, is interested.

ST. LOUIS.—Linde Air Products Co., 30 East Forty-second street, New York, will take bids shortly on its proposed $30,000 plant, to be erected at Forest Park boulevard and Sarah street.

COUNCIL BLUFFS, IA. — The state is planning a machine shop and laboratory at the Broadway water works station.

CRESCO, IA.—Bids will be received until June 1 by W. J. McArthur, city clerk, for a 100,000-gallon tank on a 100-foot tower.

DES MOINES, IA.—Interstate Mfg. Co., Oskaloosa, builder of heating and ventilating plants, will move to Des Moines and plans to erect a $30,000 factory, which will be under the management of R. W. Bailey.

DES MOINES, IA.—Wrot Iron Heating Co., furnaces, has moved into its new $25,000 plant and plans the erection of a $20,000 foundry shortly; warehouses will be built later. Donald B. Howard is general manager.

FAIRFIELD, IA.—Louden Machinery Co., manufacturer of barn equipment, has been incorporated at $750,000. The concern has been operating as a co-partnership for 20 years. The officers are: R. B. Louden, president; William Louden, vice president, and C. J. Fulton, secretary-treasurer. It has branch offices at Albany, N. Y., Fort Wayne, Ind., and St. Paul, Minn.

STILLWATER, MINN.—Earle D. Jackson, Captol Bank building, St. Paul, has been engaged to prepare plans for a municipal electric plant at Stillwater.

WATKINS, MINN.—Bonds for $10,000 have been voted for the establishment of a water works plant.

SOUTHERN STATES

ATLANTA, GA.—Plant of Austin Bros., bridge manufacturing company, was badly damaged by fire.

PLANT CITY, FLA.—J. L. Young, chairman of public works, will receive bids until June 5 for material and machinery for water works improvements, calling for equipment for stations as per plans Nos. 1, 2 and 3, which include pumping engines, steel storage tanks, etc. E. W. Mays is superintendent of the water works.

LAKE CHARLES, LA. — Bids will be taken until June 1 by C. E. House, clerk, on a double leaf Strauss trunnion bascule span over Calcasieu river in a concrete arch bridge. F. H. Frankland is engineer.

ABELINE, TEX.—J. H. Sharpe is to establish a machine shop for the manufacture of electrical apparatus.

CROSBYTON, TEX. — Nonadjustable Engine Co. has been incorporated to manufacture engines; $50,000 capital stock; by W. J. Williams, W. G. Borton and J. W. Carter.

CUMBY, TEX.—Bonds in the sum of $10,-

000 have been voted to buy the water works plant and spend $7,000 for improvements, including a 50,000-gallon, steel tank and tower. Levi I. Mercer is mayor.

HOUSTON, TEX. — Houston-Richmond & Western Traction Co. has been incorporated; $50,000 capital stock; by Edward Kennedy, W. W. Thomas and J. G. Eganhouse.

ST. JOSEPH, TEX.—Bids will be taken until June 7 by D. C. Berry, chairman of the street commission, on a 50-foot bridge over Elm creek.

VICTORIA, TEX.—Bonds have been voted for $40,000 for building a municipal electric plant.

LEE SUMMIT, ARK.—Plans are being prepared for a $30,000 water works plant.

LITTLE ROCK, ARK.—C. H. Jueryns is to spend $15,000 for improvements at his sand and gravel handling plant, including a lifting crane.

PINE BLUFF, ARK. — Standard Brakeshoe & Foundry Co. is in the market for a blower for its new foundry, other equipment having been bought. A No. 4 Root or Connersville positive pressure second hand blower is desired.

PLAIN VIEW, ARK.—W. W. Winters has been given a franchise to operate an electric light plant.

SUCCESS, ARK.—George Booser, of Corning, Ark., has been given a franchise for the construction of an electric light plant.

CHATTANOOGA, TENN.—Mills & Lupton will purchase a 150-horsepower motor and belt-driven air compressor with a capacity of 900 cubic feet.

CROSSVILLE, TENN.—An electric light plant will be established by E. B. Jones and John E. Green.

GLEASON, TENN.—Mayor has information about the establishment of a $10,000 electric light plant, for which bonds were recently authorized.

HUMBOLDT, TENN.—This city plans to install an electrically-driven, centrifugal pump and reconstruct the electric distribution system; address Manager W. M. Case.

JOHNSON CITY, TENN. — Johnson City Lumber & Mfg. Co. will take bids at once on the equipment of a 200-horsepower, steam plant, as well as woodworking equipment for its new sawmill and planing mill.

JOHNSON CITY, TENN. — Washington County Gas Co. has been incorporated at $200,000 to build a plant in Johnson City, lay 22 miles of mains and install a high pressure gas system. Plans also are made to extend lines to Jonesboro and Elizabethton.

KNOXVILLE, TENN.—Fulton Co. is reported to be planning the installation of a gas-producer plant.

KNOXVILLE, TENN.—John G. Duncan Co. will purchase a 100-horsepower, double cylinder, double drum hoisting engine, without boiler.

KNOXVILLE, TENN.—Plans for the enlargement of its plant are being made by the Maple Lumber Co., of which Carl F. Maples is president and general manager.

MILAN, TENN.—The city will spend $12,000 for improvements to the electric light plant and water works.

SPRINGFIELD, TENN.—Robertson County Farmer's Mill, Coal & Elevator Co. will build a grain elevator, flour mill and coal chute; address B. M. Rawls.

ADAMSON, OKLA.—Adamson Light & Power Co. has been incorporated; $5,000 capital stock; by James R. Williamson, Nancy Williams, Gerald and Lillian Reidt.

MANVILLE, OKLA. — This city plans to buy the electric light plant and make large improvements.

TULSA, OKLA. — Harrington, Howard & Ash, Kansas City, Mo., engineers, have been commissioned by the county commissioners to make plans for a concrete bridge over Arkansas river for which $200,000 in bonds were voted recently. Louis Klein is county clerk.

TULSA, OKLA.—Automatic Gas Tank Co. has been incorporated; $50,000 capital stock; by F. M. Ephland, N. O. Bird and M. W. Weir.

WESTERN STATES

CERESCO., NEB. — Bonds will be sold on May 24 by the city clerk for a water works plant costing $10,000. Grant & Fulton of Lincoln are engineers.

LEIGH, NEB.—Marts Engineering Co., 416 First National Bank building, will take bids in about 60 days on a $40,000 power plant for the state penitentiary.

LINCOLN, NEB. — Burlinghoff & Davis, architects, are preparing plans for the remodeling of a 10-story building, 50 x 142 feet, for the Security Mutual Life Insurance Co. About 500 tons of steel will be required.

ATCHISON, KAN.—Illinois Traction system is seeking a site for a central power plant to supply high tension current to be transmitted to Topeka. R. E. Carley, Topeka, is chief engineer.

HALSTEAD, KAN. — Arkansas Valley Interurban Railway Co. will start soon to extend its line from Halstead to Hutchinson, 22 miles. Chas. D. Ball of Wichita is superintendent.

HAYS, KAN.—The council is considering building a municipal electric light plant, costing $27,000.

KANSAS CITY, KAN. — Plans are being made for a highline bridge, costing about $500,000, over the Kansas river, of steel on concrete abutments, consisting of one 344-foot and two 200-foot spans.

CHOTEAU, MONT.—Bonds for $42,000 have been sold and the proceeds will be used for a water works plant.

HELENA, MONT. — It is reported the Northern Pacific railroad will build a line from Avon up Nevada creek toward Helmville and Ovanso into the Clearwater country.

PHILIPSBURG, MONT.—D. T. Conkling, president of the Mondamin Mining Co., is planning for installation of equipment, including electric hoist, air compressor, etc.

LOVELAND, COLO.—Bonds for $79,000 have been voted for an electric light plant.

SALT LAKE CITY, UTAH.—Parkinson & Fergstrom, architects, 1035 Security building, Los Angeles, Calif., are making plans for a 20 to 24-story bank and office building for the Desert National Bank, estimated cost, $2,000,000.

HAILEY, IDA.—Lessees of the North Star group of mines are negotiating for 4,000-horsepower in electrical energy and will erect a reduction works, possibly at Shoshone, Ida. The initial unit is to have a capacity of 100 tons daily.

IDAHO FALLS, IDA. — Gross Rotary Shovel Co., recently incorporated with $100,000 capital stock, by F. C. Bowmen and others, is to establish a factory at once.

MOSCOW, IDA.—The university committee of the state board of education will submit plans to the board for installation of a light and power plant on the campus to supply the different buildings.

PRIEST RIVER, IDA.—County commissioners are having plans prepared for a $25,000 bridge over the Pend Oreille river at Priest river to replace a ferry, Clyde J. Cheffins, Sand Point, is county surveyor.

DOTY, WASH.—W. D. Bunker, Doty, is surveying for a 5-mile extension of the Doty Lumber & Shingle Co.'s railroad.

NORTH YAKIMA, WASH.—Yakima Fruit Products Co. has increased its capital stock from $50,000 to $100,000 and will purchase or lease machinery sufficient to give the plant a capacity of 1,000 cases a day.

OLYMPIA, WASH.—William M. Manier, Olympia; Scott C. Calhoun, Seattle, and George H. Tilden, Seattle, have each applied for an electrical franchise at Olympia.

OLYMPIA, WASH.—Pacific Ice Machine & Supply Co. has been incorporated to manufacture refrigeration machinery; $10,000 capital stock; C. A. Moon, O. H. Brant and E. Brant.

RAYMOND, WASH.—Bonds for $117,000 have been sold and the proceeds will be used to buy and improve the water works plant. J. D. Henry is city engineer.

SEATTLE. — Ferris Auto Repair Co. is about to build a garage and repair shop at a cost of $25,000.

SEATTLE.—A. H. Dimmock, city engineer, recommends immediate steps be taken for constructing an additional unit to the Lake Union steam power plant at a cost of $310,000.

SEATTLE.—County commissioners will receive bids until June 1 for furnishing and erecting passenger elevators of the drum and traction type in the King county courthouse; A. Warren Gould, architect, American Bank building.

SPOKANE, WASH.—F. K. McBroom, commissioner of public works, favors a steel and concrete bridge over the Spokane river at Howard street.

SPOKANE, WASH.—Morton McCartnery, city engineer, has prepared final report on engineering tests made at two power sites for municipal lighting plant.

TACOMA, WASH.—The council is considering the question of placing the city water system on a meter basis at an estimated cost of $200,000.

TACOMA, WASH.—Western Iron & Wire Works, recently incorporated by B. E. Paul and others, is to establish a foundry for manufacturing its specialty.

PORTLAND, ORE.—Northwestern Electric Co., Wilbur E. Colman, general manager, is arranging to dispose of a bond issue to provide for extensions in new territory.

PORTLAND, ORE.—Trew Tabulating Machine Co. has been incorporated to manufacture tabulating machines; $40,000 capital stock; by A. S. Trew, A. R. Moore and C. E. Cochrane.

PORTLAND, ORE.—G. B. Hegardt, chief engineer of commissioners of public docks, is considering the construction of a public grain elevator costing $500,000. An election will be held in June to vote an appropriation of $900,000 for the labor and site.

ROSEBURG, ORE.—Citizens will vote June 3 on issuing $300,000 in bonds for a railway 30 miles to the national forest.

LOS ANGELES.—John F. Blee, architect, 509 Union League building, who is drawing plans for a $135,000, 5-story, loft building, 118 x 132 feet, for the Neptune Meter Co., will let contracts about Oct. 1. Structural steel amounting to 250 tons will be required.

REDDING, CAL.—Pittsburgh Mt. Shasta Gold Mining Co., T. V. Scott, secretary, is to erect a $100,000 plant to handle copper ore at its mine.

SAN ANDREAS, CAL.—J. E. King is to reopen the Pioneer Chief mine and install a steam hoist and other machinery. Electric power will be used when development warrants.

SAN FRANCISCO. — Automobile Safety Signal Device Mfg. Co. has been incorporated to manufacture automobile devices; $25,000 capital stock; by P. H. Abels, R. K. Abels and P. Belmore, 117 Ripley street, San Francisco.

SANTA BARBARA, CAL.—A. B. Cook, city engineer, will take bids soon on a bridge estimated to cost $20,000.

STOCKTON, CAL.—Contract has been let for a $100,000 foundry and machine shop for the Engineering & Foundry Co. J. W. Hanna is president.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Delivery to July 1.)

Bessemer, valley	$13.60
Bessemer, Pittsburgh	14.55
Basic, Pittsburgh	13.45 to 13.60
Basic, eastern Pa.	13.25
Malleable, Pittsburgh	13.45 to 13.95
Malleable foundry, Chicago	13.00
Malleable foundry, Philadelphia	15.00 to 15.25
Malleable foundry, Buffalo	12.50 to 13.00
No. 1X foundry, Philadelphia	14.25 to 14.50
No. 2 foundry, Pittsburgh	13.45 to 13.95
No. 2 foundry, valley	12.50 to 13.00
No. 2 foundry, Cleveland	13.00
No. 2 foundry, Ironton	12.50 to 12.75
No. 2 foundry, Chicago	13.00
No. 2X foundry, Philadelphia	14.00 to 14.25
No. 2X fdy., N. J. tidewater	14.25 to 14.50
No. 2X foundry, Buffalo	12.50 to 13.00
No. 2 plain, Philadelphia	13.75 to 14.00
No. 2 plain, N. J. tidewater	14.00 to 14.25
No. 2 plain, Buffalo	12.25 to 12.50
No. 2 southern, Birmingham	9.75 to 10.00
No. 2 southern, Cincinnati	12.65 to 12.90
No. 2 southern, Chicago	13.50 to 14.00
No. 2 southern, Phila. delivery	14.00 to 14.25
No. 2 southern, Cleveland	13.75 to 14.00
No. 2 south'n, New York docks	13.75 to 14.00
No. 2 southern Boston, docks	13.75 to 14.00
No. 2 south. interior, New Eng.	14.50 to 15.50
No. 2 southern, St. Louis	13.40
Virginia No. 2X furnace	12.50 to 13.00
Virginia 2X, Philadelphia	15.25
Virginia 2X, Jersey City	15.50
Virginia 2X, Boston points	15.75
Gray forge, eastern Pa.	13.25 to 13.50
Gray forge, Pittsburgh	13.20
Gray forge, Birmingham	8.75 to 9.00
Silveries, 8 per cent, Jackson, O.	14.75 to 15.25
Silveries, 5 per cent Birmingham	12.50
Silveries, 5 per cent, Chicago	16.35
Standard low phos., Phil.	19.00 to 20.00
Lebanon low phos., furnace	16.00 to 16.50
Low phos., Pittsburgh	20.95 to 21.20
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	15.25 to 16.25
Charcoal, Buffalo	15.75 to 17.00
Charcoal, Birmingham	25.00

IRON ORE

(Lower lake ports.)

Old range Bessemer, 55 per cent	$3.75
Mesabi Bessemer, 55 per cent	3.50
Old range, non-Bess., 51½ per cent	3.00
Mesabi non-Bessemer, 51½ per cent	2.85

(Per unit Philadelphia.)
(Prices nominal.)

Foreign Bess., 50 to 65 per cent	7c to 8¼c
For'n non-Bes., 50 to 65 per cent	7c to 8¼c

COKE

(At the ovens)

Connellsville furnace	$1.55 to 1.60
Connellsville fur. contr.	1.65 to 1.75
Connellsville foundry	2.00 to 2.40
Connellsville fdy. contr.	2.25 to 2.50
Wise county furnace	1.75 to 2.00
Wise county foundry	2.10 to 2.40
Pocahontas furnace	1.75 to 2.00
Pocahontas foundry	2.00 to 2.25
New River, foundry	2.50 to 3.00
New River, furnace	2.00 to 2.25

FERRO-ALLOYS

Ferro-mang., Balti., (prompt)	$100
Ferro-mang. (future), Balti	88.00
Ferro-silicon, 50 per cent, Pbgh.	71.00 to 73.00
Ferro-silicon, 50 per cent, Phila.	71.00 to 73.00
Ferro-sil., 12 to 13 per cent	18.00 to 18.50
Ferro-sil., 11 to 12 per cent	17.00 to 17.50
Ferro-sil., 10 to 11 per cent	16.00 to 16.50
Ferro-sil., 9 to 10 per cent	15.00 to 15.50
(Ferro-silicon quoted at furnace Ashland, Jackson and New Straitsville)	
Ferro-carbon titanium, carloads, per lb.	8c to 12½c

SEMI-FINISHED STEEL

Open hearth billets, Phila.	$22.06 to 22.56
Forging billets, Phila.	25.06 to 25.56
Forging billets, Pbgh.	25.00

Freight Rates via Panama Canal

Rates on finished materials, including plates, shapes, bars, wire, nails, etc., to Pacific coast points via Panama canal, per 100 lbs., in carload lots, exclusive of insurance and dockage.

From New York	$0.45
From Pittsburgh	.619
From Youngstown	.639
From Niles	.619
From Wheeling	.619
From Steubenville	.619
From Johnstown	.604
From Coatesville	.545
From Steelton	.555
From Bethlehem	.529
From Cleveland	.65
From Chicago	.765

Rates on sheet mill products $2 per ton higher.

Wire rods, Pittsburgh	$25.00
Billets, Pittsburgh	19.50 to 20.50
Billets, Youngstown	18.50 to 19.50
Sheet bars, Pittsburgh	20.00 to 21.00
Sheet bars, Youngstown	19.00 to 20.00
Muck bar, Pittsburgh	27.00

RAILS AND TRACK MATERIAL

Stand. Bess., rails, Pbgh.	1.25c
Stand. open-hearth rails, Pbgh.	1.34c
Lgt. rails, 8-lbs., Pbgh. & Chgo.	1.22c
Lgt. rails, 12 lbs., Pbg. & Chgo.	1.17c
Lgt. rails, 16 to 20 lbs., Pgh. & Chgo.	1.12c
Lgt. rails, 25 to 45 lbs., Pbgh. and Chgo.	1.07c
Relaying rails, standard, Pbgh. & Chgo.	$23.00 to 24.00
Relaying rails, light, Chicago	21.50 to 22.50
Angle bars, st. sect, Pbgh. base.	1.50c
Angle bars, st. sections, Chicago	1.50c
Spikes, railroad, Pbgh.	1.35c to 1.40c
Spikes, railroad, Chgo.	1.50c
Track bolts, Pbgh.	1.85c to 1.90c
Track bolts, Chgo.	2.00c

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—	
Cleveland	$0.95
Newark, N. J.	3.00
New England	3.00
Philadelphia	2.79
Pittsburgh	.95
St. Louis	3.18
Buffalo to:—	
Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail).	2.58
New York and Brooklyn (by canal)	1.00 to 1.50
Virginia furnaces to:—	
Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88
Birmingham, Ala., to:—	
Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
New York (all rail)	6.15
New York (rail and water)	4.25
Philadelphia (all rail)	5.20
Philadelphia (rail and water)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
Chicago, to:—	
Des Moines	$2.80
Milwaukee	.50
Moline, Ill.	1.47
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:—	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

SHAPES, PLATES AND BARS

Structural shapes, Pittsburgh	1.20c
Structural shapes, Chicago	1.39c
Structural shapes, Philadelphia	1.359c
Structural shapes, New York	1.369c
Struc. shapes, San Francisco	2.00c to 2.05c
Tank plates, Chicago	1.29c to 1.39c
Tank plates, Pittsburgh	1.15c to 1.20c
Tank plates, Philadelphia	1.359c
Tank plates, New York	1.369c
Bars, soft steel, Pittsburgh	1.20c
Bars, soft steel, Chicago	1.39c
Bars, soft steel, Philadelphia	1.359c
Bars, soft steel, New York	1.369c
Hoops, carloads, Pittsburgh	1.25c to 1.30c
Bands, Pittsburgh	1.20c
Shafting, Pbgh., carloads, prompt	68 to 70 per cent off
Shafting, Pbgh., contr.	68 per cent off
Screw stks., Pgh. carl'ds,	68 to 70 per cent off
Bar iron, Chicago	1.15c to 1.20c
Bar iron, Philadelphia	1.175c to 1.225c
Bar iron, New York	1.15c to 1.20c
Bar iron, Cleveland	1.20c to 1.25c
Bar iron, Pittsburgh	1.20c to 1.25c
Hard steel bars, Chicago	1.20c to 1.25c
Smooth finish, mchy. steel, Chi.	1.68c

SHEETS AND TIN PLATE

No. 28, black, Pittsburgh	1.80c to 1.90c
No. 28, black, Chicago	1.89c to 1.94c
No. 28, tin mill, black, Pbgh.	1.85c to 1.90c
No. 28, galvanized, Pbgh.	3.40c to 3.50c
No. 28, galvanized, Chgo., nom.	3.94c
No. 10, blue, annealed, Pbgh.	1.35c
No. 10, blue, annealed, Phila.	1.459c to 1.509c
Tin plate, 100 lb., coke base	3.20c to 3.35c

EXTRAS FOR SHEET OR TIN MILL SPECIFICATIONS

(Per hundred pounds.)

Single pickled, cold roll, and re-anl.	30 cents
Hot roll'd pickl'd and anl., tin mill	25 cents
Full pickl'd, cold rolled and re-anl.	50 cents
Auto sheets	75 cents
Blued stove pipe stock	10 cents
Range steel	30 cents
Re-squaring	10 cents
Roller leveling	10 cents
Patent leveling and re-squaring	35 cents
Oiling sheets	10 cents
Deoxidizing	10 cents
Lime finish	10 cents
Open-hearth stamping steel, free from mill scale	55 cents
Special open hearth deep stpg. steel free from mill scale	80 cents
Extra deep special auto body stock $1.25	
Ext. for 28 gage ov. 32 to 36-in. wide	10 cents
No reduction for sheets not annealed.	

The above extras apply on both sheet and tin mill specifications, at the same rate.

IRON AND STEEL PIPE

(Pittsburgh.)

	Black. Butt-weld.	Galv. Butt-weld.
Steel, ¼ to 3 inches	79	68½
Iron, ¼ to 2 inches	71	57
	Lap-weld.	
Steel, 2½ to 6 inches	78	67½

BOILER TUBES

Steel, 3½ to 4½ inches l. c. l.	74
Iron, 3½ to 4½ inches l. c. l.	62

WIRE PRODUCTS

(Retailers' price 5 cents above jobbers' quotation.)

Wire nails, jobbers, Pittsburgh	$1.55 to 1.60
Plain wire, jobbers, Pittsburgh	1.35 to 1.40
Galvanized wire, jobbers, Pbgh.	1.85 to 1.90
Polished staples, Pbgh.	1.55 to 1.60
Galvanized staples, Pbgh.	2.05 to 2.10
Barb wire, painted, jobbers, Pbgh.	1.55 to 1.60
Barb wire, galv., jobbers, Pbgh.	2.05 to 2.10

IRON AND STEEL PRICES

Corrected up to Tuesday noon

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, smaller or shorter, rolled threads, 80 and 15; cut threads 80 and 10; larger or longer, 75 and 17½.

Machine bolts with hot pressed nuts ⅜ x 4 inches, smaller or shorter, rolled 80 and 20; cut, 80 and 15; larger or longer, 80.

Gimlet and cone point lag or coach screws, 85 and 2½.

Hot pressed square, blank or tapped nuts. $6.40 off list; hot pressed hexagon blank or tapped, $7.30 off.

Cold pressed, square, blank or tapped, $6.10 off; hexagon, blank or tapped, ⅜ inch and larger, $7.50; ⅞-inch and smaller, $8.00.

RIVETS

Structural rivets, Pbgh	1.45c to 1.50c
Structural rivets, Chgo	1.68c
Boiler rivets, Pbgh	1.55c to 1.60c
Boiler rivets, Chgo	1.78c

STEEL SHEET PILING

(Pittsburgh.)

Base sizes	1.55c to 1.60c

COLD ROLLED STRIP STEEL

(Subject to regular extras.)

0.10 to 0.19 Carbon.	Base price Cut to length Hard.	Soft.
1½ inch and wider		
0.100 and thicker	2.85	3.10
0.050 to 0.099 inc.	2.95	3.20
0.035 to 0.049 inc.	3.10	3.35
0.031 to 0.034 inc.	3.35	3.75
0.025 to 0.030 inc.	3.60	4.00
0.020 to 0.024 inc.	3.80	4.20
0.017 to 0.019 inc.	4.70	5.20
0.015 and 0.016	5.10	5.60
0.013 and 0.014	5.95	6.45
0.012	6.55	7.05
0.011	6.90	7.40
0.010	7.25	7.75
	Coils.	
0.100 and thicker	2.75	3.00
0.050 to 0.099 inc.	2.80	3.05
0.035 to 0.049 inc.	2.95	3.20
0.031 to 0.034 inc.	3.10	3.50
0.025 to 0.030 inc.	3.20	3.60
0.020 to 0.024 inc.	3.30	3.70
0.017 to 0.019 inc.	3.60	4.10
0.015 and 0.016	4.00	4.50
0.013 and 0.014	4.70	5.20
0.012	5.05	5.55
0.011	5.40	5.90
0.010	5.75	6.25

CAST IRON WATER PIPE

Six to 48-in., Cleveland	23.75
Four-inch, Chicago	26.00
Six to 12 inches, Chicago	24.00
Large sizes, Chgo	23.00
Six-inch, New York	20.50 to 21.50
Four-inch, New York	21.50 to 22.50
Four-inch, Birmingham	19.50
Six-inch and larger, Birmingham	19.50

Gas pipe, $1 per ton higher than water.

WAREHOUSE PRICES

Steel bars, Chicago	1.65c
Steel bars, Cleveland	1.80c
Steel bars, Cincinnati	1.75c to 1.80c
Steel bars, Philadelphia	1.70c
Steel bars, New York	1.80c
Steel bars, St. Louis	1.70c
Iron bars, Chicago	1.65c
Iron bars, Cleveland	1.75c
Iron bars, St. Louis	1.65c
Iron bars, Cincinnati	1.70c to 1.80c
Iron bars, Philadelphia	1.55c
Iron bars, New York	1.65c to 1.70c
Hoops, Chicago	2.15c
Shapes and plates, Chicago	1.75c
Shapes and plates, Cleveland	1.90c
Shapes and plates, Cincinnati	1.85c to 1.90c
Shapes and plates, St. Louis	1.80c
Shapes and plates, Philadelphia	1.70c
Shapes and plates, New York	1.85c
No. 10 blue anl. sheets, Chgo	1.95c
No. 10 blue anl. sheets, Cleve	2.05c
No. 10 blue anl. sh. St. Louis	2.00c
No. 10 blue anl. sheets, Cinci	2.00c
No. 28 black sheets, Chgo	2.45c
No. 28 black sheets, Cleveland	2.45c
No. 28 black sheets, Cincinnati	2.45c to 2.55c
No. 28 black sheets, St. Louis	2.55c
No. 28 galv. sheets, Chgo	4.00c
No. 28 galv. sheets, Cleveland	3.50c
No. 28 galv. sheets, Cincinnati	3.40c to 3.55c
No. 28 galv. sheets, St. Louis	3.75c

Freight Rates, Coke

From Connellsville regions, per 2,000 lbs., to:—	
Baltimore	$1.80
Buffalo	1.85
Chicago	2.50
Cleveland	1.60
Detroit	2.10
East St. Louis	2.80
Joliet	2.50
Louisville	2.50
Milwaukee	2.70
New York	2.85
Philadelphia	2.05
Pittsburgh	.75
Richmond, Va.	2.94
Toledo	1.85
Valley Furnaces	1.20
Cincinnati	2.00

IRON AND STEEL SCRAP

(Net Tons.)

No. 1 railroad wrought, Chgo.	$ 8.75 to 9.25
No. 1 railroad wrought, Cleve.	9.25 to 9.50
No. 1 railroad wrought, St. L.	7.75 to 8.00
No. 1 railroad wrought, Cincin.	7.50 to 8.00
No. 2 railroad wrought, Chgo.	8.25 to 8.50
No. 2 railroad wrought, St. L.	7.25 to 7.50
Arch bars and transoms, Chgo.	12.00 to 12.50
Arch bars and transoms, St. L.	10.50 to 11.00
Knuckles, coup. & spr'gs, Chgo.	8.75 to 9.00
Knuckles, coup. & spr'gs, St. L.	8.00 to 8.50
Shafting, Chicago	11.50 to 12.00
Shafting, St. Louis	10.50 to 11.00
Steel car axles, Chicago	10.25 to 10.75
Steel car axles, St. Louis	10.00 to 10.25
Locomotive tires, Chicago	8.50 to 9.00
Locomotive tires, St. Louis	8.75 to 9.00
Cut forge, Chicago	8.25 to 8.75
Pipes and flues, Chicago	6.25 to 6.75
Pipes and flues, Cleveland	7.25 to 8.00

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 lbs. to:—	
New York	16.9 cents
Philadelphia	15.9 cents
Boston	18.9 cents
Buffalo	11.6 cents
Baltimore	15.4 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Minneapolis and St. Paul	32.9 cents
Denver	68.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast, (all rail)	80 cents
Pacific coast, via Panama canal	61.9 cents

Pipes and flues, St. Louis	6.00 to 6.25
No. 1 cast, Chicago	9.00 to 9.25
No. 1 cast, Cleveland	10.00
No. 1 cast, Cincinnati	8.50 to 9.00
No. 1 cast, St. Louis	8.75 to 9.00
No. 1 busheling, Chicago	7.25 to 7.75
No. 1 busheling, Cleveland	8.25 to 8.50
No. 1 busheling, Cincinnati	6.00 to 6.50
No. 1 busheling, St. Louis	6.75 to 7.00
No. 2 busheling, Chicago	6.00 to 6.50
No. 1 boiler plate, cut, Chgo	5.50 to 5.75
No. 1 boiler plate, cut, St. L.	5.25 to 5.50
Boiler punchings, Chicago	8.25 to 8.75
Cast borings, Chicago	5.25 to 5.50
Cast borings, Cleveland	6.00 to 6.25
Cast borings, Cincinnati	4.75 to 5.25
Cast borings, St. Louis	5.25 to 5.50
Machine shop turnings, Chicago	5.00 to 5.50
Machine shop turnings, Cleve.	6.00
Machine shop turnings, Cinci.	$ 4.25 to 4.75
Machine shop turnings, St. L.	5.50 to 5.75
Malleable agricultural, Chicago	7.50 to 7.75
Malleable agricultural, St. Louis	5.50 to 6.00
Malleable, railroad, Chicago	7.75 to 8.25
Malleable, railroad, Cincinnati	6.00 to 6.50
Malleable, railroad, St. Louis	6.25 to 6.50
Angle bars, iron, Chicago	11.75 to 12.25
Angle bars, iron, St. Louis	10.00 to 10.50
Angle bars, steel, Chicago	8.25 to 8.50
Angle bars, steel, St. Louis	8.00 to 8.25
Stove plate, Chicago	7.75 to 8.00
Stove plate, Cleveland	8.00 to 8.25
Stove plate, Buffalo	8.25 to 8.75
Stove plate, Cincinnati	6.00 to 6.50
Stove plate, St. Louis	6.00 to 6.25
Bundled sheet, Cincinnati	4.75 to 5.25

(Gross tons.)

Heavy melting steel, Pbgh	$11.75 to 12.00
Heavy melting steel, Buffalo	10.50 to 11.00
Heavy melting steel, Chgo	9.25 to 9.50
Heavy melting steel, Cleveland	10.25 to 10.60
Heavy melting steel, Cincinnati	8.50 to 9.00
Heavy melting steel, eastern Pa.	11.00 to 11.50
Heavy melting steel, New York	8.75 to 9.00
Heavy melting steel, St. Louis	9.00 to 9.50
Grate bars, Buffalo	9.00 to 9.50
Grate bars, New York	6.50 to 7.00
No. 1 railroad wrought, east Pa.	12.50 to 13.00
No. 1 railroad wrought, Pbgh	10.25
No. 1 R. R. wght., New York	10.50 to 11.00
No. 1 R. R. wrought, Buffalo	10.50 to 11.00
Shafting, New York	12.50 to 13.00
Shafting, eastern Pa.	15.00 to 15.50
Wrought pipe, New York	8.25 to 8.50
Wrought pipe, eastern Pa.	10.50 to 10.75
Mch. shop turnings, New York	6.00 to 6.25
Machine shop turnings, Buffalo	5.75 to 6.25
Mch. shop turnings, Pbgh	8.00 to 8.25
Mch. shop turnings, eastern Pa.	8.00 to 8.50
Cast borings, New York	6.00 to 6.25
Cast borings, eastern Pa.	8.25 to 8.50
Cast borings, Buffalo	6.50 to 6.75
Cast borings, Pittsburgh	8.50 to 8.75
Stove plate, N. J. points	8.50 to 9.00
Stove plate, Pittsburgh	8.25 to 8.75
Stove plate, eastern Pa.	9.00 to 9.50
Shoveling steel, Chicago	8.75 to 9.50
Shoveling steel, St. Louis	8.00 to 8.25
Reroll. rails, 5 ft. & ov., Pbgh.	12.00 to 12.50
Reroll. rails, 5 ft. & ov., Chgo.	10.00 to 10.50
Reroll. rails, 5 ft. & ov., Cleve.	10.50 to 11.00
Reroll. rails, 5 ft. & ov., E. Pa.	11.50 to 12.00
Reroll. rails, 5 ft. & ov., St. L.	10.00 to 10.25
Steel rails, short, Chicago	10.00 to 10.50
Steel rails, short, Cleveland	11.00 to 11.50
Steel rails, short, St. Louis	9.25 to 9.50
Iron rails, Cleveland nom.	11.75 to 12.00
Iron rails, Chgo.	12.00 to 12.50
Iron rails, Cincinnati	10.25 to 10.75
Iron rails, St. Louis	10.00 to 10.50
Iron rails, Pittsburgh (nom.)	12.50 to 13.00
Frogs, switches, guards, Chgo.	9.25 to 9.50
Frogs, switches, guards, St. L.	9.00 to 9.25
Car wheels, (iron), Pittsburgh	11.50
Car wheels, (steel), Pittsburgh	12.25 to 12.50
Car wheels, Chicago	9.75 to 10.00
Car wheels, eastern Pa.	10.75 to 11.25
Car wheels, Buffalo	10.00 to 10.50
Car wheels, N. J. points	9.00 to 9.25
Car wheels, St. Louis	9.75 to 10.00
Iron axles, Pittsburgh	17.50
Iron axles, Cincinnati	19.00 to 20.00
Iron axles, eastern Pa.	18.50 to 19.00
Iron axles, Buffalo	16.00 to 16.50
Iron axles, Chicago	15.25 to 15.75
Steel car axles, New York	13.50 to 14.00
Steel car axles, Buffalo	12.00 to 12.50
Steel car axles, Cleveland	12.00 to 12.50
Steel car axles, eastern Pa.	14.00 to 14.50
No. 1 busheling, Buffalo	8.50 to 9.00
No. 1 busheling, Pittsburgh	9.75 to 10.00
No. 2 busheling, Buffalo	6.50 to 7.00
Low phosphorus steel, Buffalo	12.50 to 13.00
Low phosphorus steel, Pbgh.	14.00
Low phos. steel, eastern Pa.	14.00 to 15.00
No. 1 forge, eastern Pa.	8.50 to 9.00
No. 1 cast, eastern Pa.	11.75 to 12.25
No. 1 cast, Pittsburgh	11.75 to 12.00
No. 1 heavy cast N. J. points	11.50 to 11.75
Mall. railroad, Cleveland	10.00 to 10.25
Malleable railroad, Pittsburgh	10.00
Malleable railroad, Buffalo	9.50 to 10.00
Malleable railroad, east Pa.	9.25 to 9.75
Bundled sheet, Pittsburgh	9.00
Bundled sheet, Cleveland (nom.)	7.75 to 8.25
Bundled sheet, Buffalo	7.00 to 7.50

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400 Chestnut St. Philadelphia, Pa.

History of the Large Gas Engine

(*Continued from page* 1016.)

and gives a very easy turning moment without sacrificing efficiency.

Now, I think, it will be satisfactory if I finish my article with the description of the principal features of the last type of large engine designed, only two years ago, by the engineers of the Cockerill company. One specimen of this type, which is probably the most powerful gas engine actually existing in the world, was being erected at Seraing when the war was declared.

In this system the cranked shaft was left, because of the numerous cases of breakage and dislocations of the shafts which have taken place in the large engines of all kinds of construction. These accidents have generally been caused by the disalignment of the brasses of the bearings, the axes of which it is impossible to maintain in a straight line because of the difference in wear resulting from the unequal and not parallel forces that they must support. The wear of the two bearings placed on each side of the flywheel is principally vertical, whereas the wear of the third bearing is chiefly horizontal. After working a certain time the shaft is really supported by the two extreme bearings, is not in normal condition, and is liable to break when it is in one piece, or to be dislocated if it is composed of several assembled parts. When the shaft is resting on two bearings, its axis will remain right if the dimensions are well calculated, and the conditions for which the calculation has been made remain unchanged during the work.

The cylinders are cast in one piece, with their water jacket, like the Nueremberg cylinders, but they are also provided with tie bolts, fixed parallel to the axis in the water space. These bolts take care of the tension stresses. The water space is very large, so that it is very easy to clean it. It is also easy to enter the cylinder in order to inspect and clean the interior walls, the piston and the covers, without taking off the latter; it is only necessary to take off the boxes of the inlet valves in order to allow a workman to enter the cylinder.

The pistons of the Cockerill engines are in two parts, bolted on a large central collar forged on the hollow rod, and held together by bolts so arranged that the pressure is transmitted directly to the rod during every stroke. The two internal walls of the piston naturally serve as partitions to secure a double water circulation and satisfactory cooling. Further, no considerable metallic mass is exposed to the flame so that excessive heating and the pre-ignition of the gases is prevented.

The cast iron packings of the stuffing boxes are made in three parts, held together by a circular spring, so that it is not necessary to disconnect the coupling rods from the crossheads in order to renew these packings.

The valve gearing is interesting. The air and gas valves are fixed on a hollow spindle, through which the rod of the mixing valve passes. On weak loads the mixing valve opens only at the beginning of the stroke. The piston produces a vacuum in the cylinder till the governor allows the air and gas valves to be lifted up. The composition of the mixture is constant, and the filling of the cylinder is satisfactory on account of the speed of the entering gases. The governor acts on a trip gear as in corliss and similar steam engines. It varies in construction according as to whether the engine is a blowing engine or employed for driving a dynamo. In the latter case, the speed variation is 2 per cent of the mean, but the mean number of revolutions may be altered by hand from 10 to 15 per cent.

All the moving parts, the crank pin, the pin and slippers of the cross head, and the two bearings of the main shaft

are lubricated by a piston force pump which delivers oil under pressure according to the needs and speed. The very large Cockerill engines are provided with two lubricating pumps, each being sufficient for the engine. Before returning to the pumps, the oil is purified and cooled in a tubular cooling apparatus. The introduction of the cooling water into the piston rods is effected without any joint, through a so-called *trombone* (sliding pipe) the stuffing of which may easily be replaced during work. The cross head slippers and the main bearings are also cooled by circulating water to prevent heating. The outlet valves are cooled by water entering and going out through rubber pipes with metallic fittings, branched on fixed pipes, which prevent water loss.

The engine is started with compressed air by means of a single hand wheel, without any possible mistake. As in all the modern large engines, the frame is continuous and cylindrical, giving a strong base to the whole engine. Table I gives the principal dimensions of the different sizes of the new Cockerill engines. These engines weigh about 243 pounds per brake horsepower without their flywheel, the weight of which depends on the required regularity. It is the last and most powerful engine listed in Table I that the Cockerill company was erecting at its works in July, 1914, the main shaft of which was exhibited in Ghent in 1913.

Making Steam from Waste Heat

The gases which escape from the gas engine leave at a temperature of about 500 degrees Cent. and, in the large engines, carry off a considerable amount of heat. The idea of utilizing this heat is, in fact, a very simple and natural one. However, the realization was not attempted before the year 1909. After several trials the engineers of the Cockerill company decided upon the use of a tubular horizontal boiler, continued by a vertical tubular water heater, supporting the chimney. The temperature of the gases is lowered by the boiler to 230 degrees Cent. and by the economizer to 110 degrees Cent. Water is heated by the latter from 8 degrees Cent. to 170 degrees Cent., and is deprived of its calcareous salts, so that it is possible to clean this apparatus without stopping the engine. On the other hand, the corrosion resulting from the sulphur contained in the gases is limited to the heater. The boilers are provided with an automatic feed.

Four boilers are actually erected at the Cockerill works and deal with the gases of four engines developing together 5,000 brake horsepower. Steam is raised at a pressure of 114 pounds per square inch in the proportion of 1.93 pounds per electrical horsepower developed by the engines, and is supplied to a turbine developing about 650 brake horsepower. The efficiency of these boilers is about 58 per cent. They recover 55 per cent of the heat of the exhaust gases, and thus increase the thermal efficiency of the engine plant by about 13 per cent. This result was sufficiently enticing to induce several English and Belgian metallurgical companies to adopt this new improvement.

The R. J. Watters Co., Buffalo, is manufacturing a new pickling preparation for removing rust, scale and other oxides from steel, iron, copper, brass, German silver, etc. It is said the preparation will not fume, burn the clothing of workmen, deteriorate the equipment or pit the metal, and that it will remove scale and rust without attacking the underlying prime metal.

The New York office of the Nordberg Mfg. Co., Milwaukee, Wis., has been removed from 42 Broadway to the new Equitable building, 120 Broadway. The office is in charge of M. N. MacLaren.

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Miscellaneous Classified
Minimum, 25 words, $1.00. Each additional word, 4c. All capitals, 25 words, $2.00. Each additional word, 8c.

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STRUCTURAL DETAILERS WANTED for structural shop in Havana, Cuba. Must be fully experienced, rapid and accurate on mill building work. State experience and salary at once. Permanent position for right men. American Steel Co. of Cuba. Box 654, Havana.

WANTED, COMPETENT OFFICE MAN, by Steel manufacturer, one used to handling heavy correspondence; must be familiar with follow-up systems; one with some selling experience preferred. To receive attention, state age, experience in detail, and salary desired. Applications considered strictly confidential. Address Box 431, THE IRON TRADE REVIEW, Cleveland, O.

A MAN COMPETENT TO HANDLE correspondence and eventually act as Office Manager, experience in tool and special steel business required. Excellent opportunity for proper person. To receive attention, age, experience and salary expected must be stated. Address Box 426, THE IRON TRADE REVIEW, Cleveland, O.

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MECHANICAL ENGINEER; TECHNIcal training; 18 years' experience gas engines, machine tools, mill buildings, hydraulic machinery, ordnance work; 14 years in charge of work; 6 years as superintendent; can fill position of superintendent or chief engineer; good references. Address Box 341, THE IRON TRADE REVIEW, Cleveland, O.

YOUNG MAN OF GOOD APPEARANCE and address, having ten years experience in the manufacture of open hearth steel, at present assistant superintendent of plant, desires change to a steel or manufacturing company which wants a hustler to understudy business; would like change to sales department; have high executive ability; can organize and handle all kinds of labor with efficiency; correspondence solicited. Address Box 418, THE IRON TRADE REVIEW, Cleveland, O.

Positions Wanted

STRIP STEEL MILL SALESMAN, (30) for road or New York representative, experienced in selling hot and cold rolled strip steel, salary or salary and commission. Address Box 419, THE IRON TRADE REVIEW, Cleveland, O.

PURCHASING AGENT AND COST accountant desires position; 32 years of age; 12 years' experience in large manufacturing plants. Highest references as to ability and character. Address Box 327, THE IRON TRADE REVIEW, Cleveland, O.

PORCELAIN ENAMELER:—A MAN OF wide experience wants a job to build or operate a plant. Address Box 430, THE IRON TRADE REVIEW, Cleveland, O.

SUPERINTENDENT OR FOREMAN OF foundry desires position. Up to the minute in all branches. A-1 references. Address Box 429, THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED BY PRODUCTION man with 20 years' experience in foundry, machine shop and pattern shop. Address Box 428, THE IRON TRADE REVIEW, Cleveland, O.

OPERATING SUPERINTENDENT AND efficiency executive of crucible, electric and open hearth steel plants and rolling mills, fully qualified by seventeen years successful plant management experience, desires position wherein practical metallurgical, producing, economic, statistical and financial experience are required. Address Box 409, THE IRON TRADE REVIEW, Cleveland, O.

STEEL FOUNDRY SUPERINTENDENCY by aggressive, competent man; crucible, electric or open hearth plants preferred. Expert knowledge of mixtures, melting, molding, casting and cost. Savings effected; refinements introduced. Address Box 410, THE IRON TRADE REVIEW, Cleveland, O.

EXPERIENCED PATTERN MAKER wishes position as foreman; over 10 years in charge of shops employing from 20 to 100 men making patterns for gas and oil engines and electrical machinery. Broad experience with molding machines. Address Box 253, THE IRON TRADE REVIEW, Cleveland, O.

MINE SUPERINTENDENT, MINING engineer desires similar position, ten years experience, five years superintendent of iron mine. At present employed, desire change to better living conditions. Will start on moderate salary with chance for advancement. Address Box 416, THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED AS FOUNDRY foreman; experienced on gas engine work; general jobbing; good cupola practice; A-1 references. Address Box 417, THE IRON TRADE REVIEW, Cleveland, O.

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Positions Wanted

I AM AN EXPERT IRON ORE OPERATOR. Married, age 39, 14 years service with one company, 5 years as superintendent. Understand thoroughly and have worked all methods of iron ore mining, including slicing, caving, milling, backstopping and open pit. Am a mining engineer. I can produce maximum results at minimum costs. Initial salary not so important as position offering a future. Best references. Address Box 297, THE IRON TRADE REVIEW, Cleveland, O.

MASTER MECHANIC OR MACHINE shop foreman, desires position; 30; married; technical education; 12 years' experience; rolling mills, sheet mills and blast furnaces; best references. Address Box 313, THE IRON TRADE REVIEW, Cleveland, O.

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This property is offered for sale by a specialty business, desirous of building upon another site, better adapted to its line of specialties. Address all communications and inquiries to Box 405, THE IRON TRADE REVIEW, Cleveland, O.

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